COAL AGE

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There are mines in almost every coal field of the United States where the men are working a seam that carries bands of impurities which must be separated from the coal to make it marketable.

In any given district, these bands of impurities are fairly uniform in number as well as in thickness and composition, but in comparing different fields, every conceivable variation is encountered. Often the question of whether a certain seam of coal can be worked profitably, hinges entirely on the possibility and cost of eliminating the slate and bone.

There are three possible methods for handling such impurities—1. Separating the refuse and the coal inside the mine while loading the mine cars. 2. Loading the entire seam just as it comes (coal and bands of impurities), and then depending on mechanical means such as washeries and picking belts to eliminate the waste rock at the tipple. 3. A combination of 1 and 2.

The last method is the one generally adopted.

At all mines where either the first or last plan is in vogue, some system of inspection has to be employed to check the work of the loaders. In connection with such inspection a system of dockage is enforced to punish all offenders who load more than the maximum allowable quantity of refuse, and in extreme cases the guilty ones are discharged. Just now with miners plentiful and orders scarce the "slate bosses" are rarely questioned when they turn in discharges.

In many camps the earnings of the miners as well as the dividends of the operating company are largely dependent on the method of enforcing the dockage system. For example, if the character of the coal seam is such that the miners can just make a living at best, they are liable to take chances occasionally and load more rock than they should, hoping that the inspector won't happen to pick the outlawed car. As a result when the miner does get caught, he is either fined so heavily that his earnings for the month are reduced below the possible living minimum or he is discharged.

The operating company is also a heavy loser, because the average quantity of impurities in the "mine-run" is increased and the constant changing of miners is costly.

Much of this trouble can be eliminated by employing inspectors to watch the loading of the coal at the working face. These inspectors give the miners to understand that the company does not want to dock them and should have no need for docking them; they instruct the miners as to the best method of shooting and loading the coal and whenever necessary load a part of a car just to show the worker that it can be done. Four or five inspectors can cover a pretty large mine if they are conscientious and manage to visit every working place several times each week.

The miner is thus made to realize that he can earn just as much by following instructions as he could under any other plan, and he can save the energy formerly wasted in topping cars of dirty coal, besides he can keep a clear conscience and relieve his family of the constant fear of his discharge.

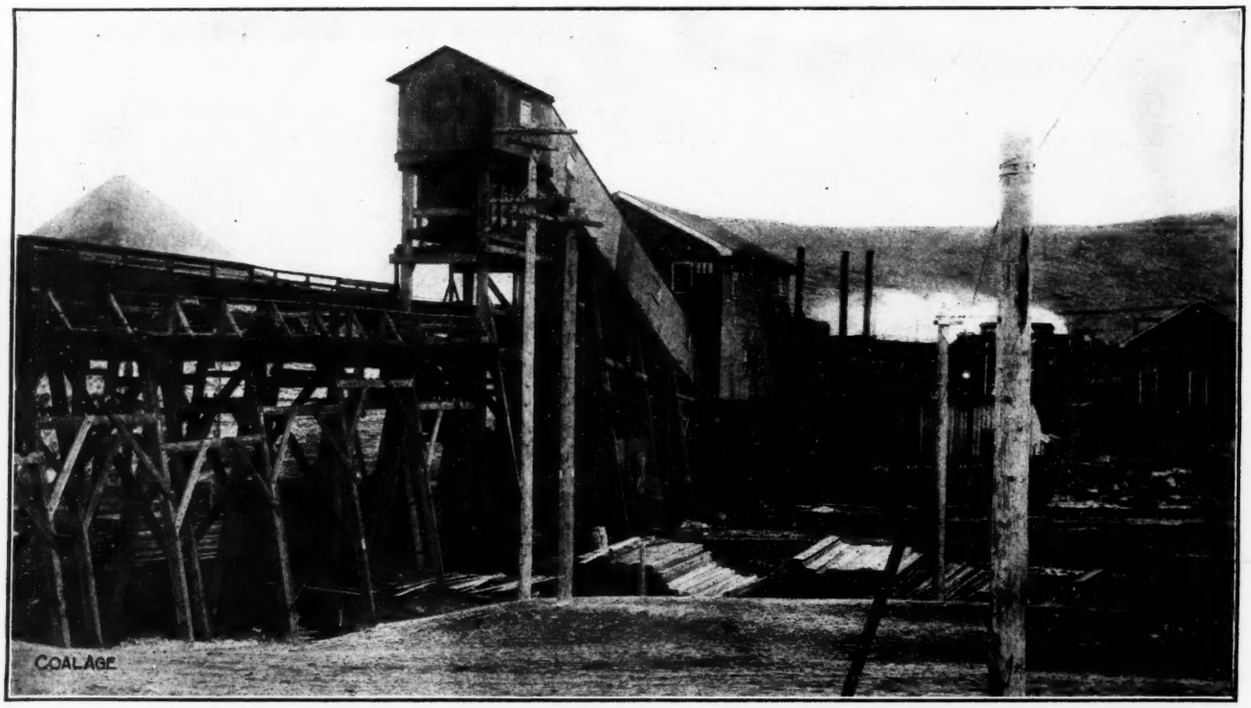
A clear conscience is a pretty good taskmaster; help the miner to keep it awake.

The Electrification of the Cottonwood Coal Co.'s Mines

By Cornelius Webber*

SYNOPSIS—A thorough investigation of conditions led to the belief that electric operation would be cheaper than steam. Records kept after electrification was completed verified the soundness of this conclusion.

After a thorough investigation covering operating expenses and the various advantages to be gained by changing from steam to electrical operation, the Cottonwood Coal Co., of Stockett, Mont., installed the latter system and commenced operation with the new equipment in November, 1912.



General View of a Tipple

At the time the electrification was completed the company was operating three mines, Nos. 5, 6 and 7.

Number 5 mine is located about one mile northwest of Stockett, No. 6 mine about two miles southeast and No. 7 mine about 4½ miles northwest.

Originally these three mines were operated by steam driven air-compressor plants, Nos. 5 and 6 mines having been operated from an installation common to both. The latter plant, as well as the haulage and crusher equipment, was located in the town and between the mines.

No. 7 mine was provided with a separate steam-driven compressed-air plant and the coal was loaded from a separate tipple.

Compressed-air coal punchers, drills, pumps and hoisting engines were used in all mines, a steam-driven rope-haulage system transported the coal from Nos. 5 and 6 mines and separate steam-driven ventilating fans supplied fresh air. The crusher plant, slack-coal conveyor, box-car loader, rock hoist, sawmill and machine shop were all operated by steam engines.

The comparatively low cost of electrical energy and the elimination of many high-priced men were in a great measure responsible for the electrification. The old air compressor plant, at Stockett, was abandoned, and a new motor-driven plant provided. The steam haulage machinery was retained, while motors were substituted for steam engines in the crusher plant, box-car loader, sawmill and slack-coal conveyor. Electric lines were extended to mines Nos. 5 and 6, for operating the old steam-driven fans and motors.

With the present arrangement 3-phase 60-cycle current is purchased from the Great Falls Power Co., and enters the substation in Stockett at 50,000 volts. After passing through suitable high-tension switching apparatus it is stepped down by means of three 1200-kv.-a. water-cooled transformers to 2200 volts.

Two 500-hp., 2200-volt, 3-phase, 450-r.p.m. induction motors with external starting resistance and two belt-driven Ladlow-Dunn-Gordon, two-stage, 24x29-in. (low-pressure cylinder) 110-r.p.m. air compressors are installed in the same building, the pipe line being connected to the old air mains.

One 2200-volt, 3-phase line runs to No. 5 mine and another to No. 6. At each of these two plants the current is stepped down to 220 volts. A 35-hp. induction motor at No. 6, and one 35-hp. and one 10-hp. induction motor at No. 5 mine operate the ventilating fans.

*Electrical engineer, Cottonwood Coal Co., Stockett, Mont.

The current is also stepped down for operating the sawmill the slack-coal conveyor, a 30-hp. motor and for the company lights.

The crusher plant is located near the No. 5 mine 2200-volt line, which is tapped to supply a 75-hp., 2200-volt induction motor and a 2200- to 440-volt, 3-phase transformer, which supplies a 50-hp. box-car loader and a 10-hp. rock conveyor motor. A 2200-volt primary lighting distributing circuit supplies the town.

At No. 7 mine the steam-driven compressed-air and ventilating plants were entirely abandoned and electrical coal-punching machines, drills, pumps, fan and hoist motor, together with an electric-locomotive haulage system were installed.

The current comes in at 2200 volts, 3-phase from a substation at Sand Coulee, one and one-half miles away, and operates a 200-hp. induction motor, direct-connected to a 125-kw., 250-volt, direct current generator, which supplies the electric locomotive.

A branch 2200-volt circuit feeds two 50-kv.-a., 3-phase, 2200- to 440-volt transformers, the latter supplying a 35-hp. fan motor, a 35-hp. hoist motor, a 7½-hp. and a 10-hp. pump motor, besides two 5-hp. drills and six 7½-hp. coal punchers.

Lighting service is furnished by a separate transformer at 110 volts secondary, and a forge blower in the blacksmith shop operates from the same mains.

Meters have been installed at various points and accurate account was kept of the operation. The figures below show the average consumption of current per month during the first year and a comparison between direct application of electrical power and indirect application through electrically operated air compressors.

NUMBERS 5 AND 6 MINES

Average number of working days per month..... 20

Average Kilowatt-Hour Consumption of Electrical Energy, per Month

Compressors	Crusher Plant	Mine No. 5 Fan	Mine No. 6 Fan	Slack Coal Conveyor	Lighting
228,000	3750	8970	4500	820	1650

Total, 247,690.

Average tonnage produced per month..... 30,300

Average Kilowatt-Hour Consumption per Ton Produced

Compressed Air	Crushing	Ventilation	Miscellaneous	Total
7.52	0.123	0.444	0.08	8.168

Average number of pounds of coal consumed per ton produced previous to electrification.....	114.4
Average number of pounds of coal consumed per ton produced after electrification.....	27.2
Percentage cost of power-plant labor after electrification to cost of same item before electrification..	60.6

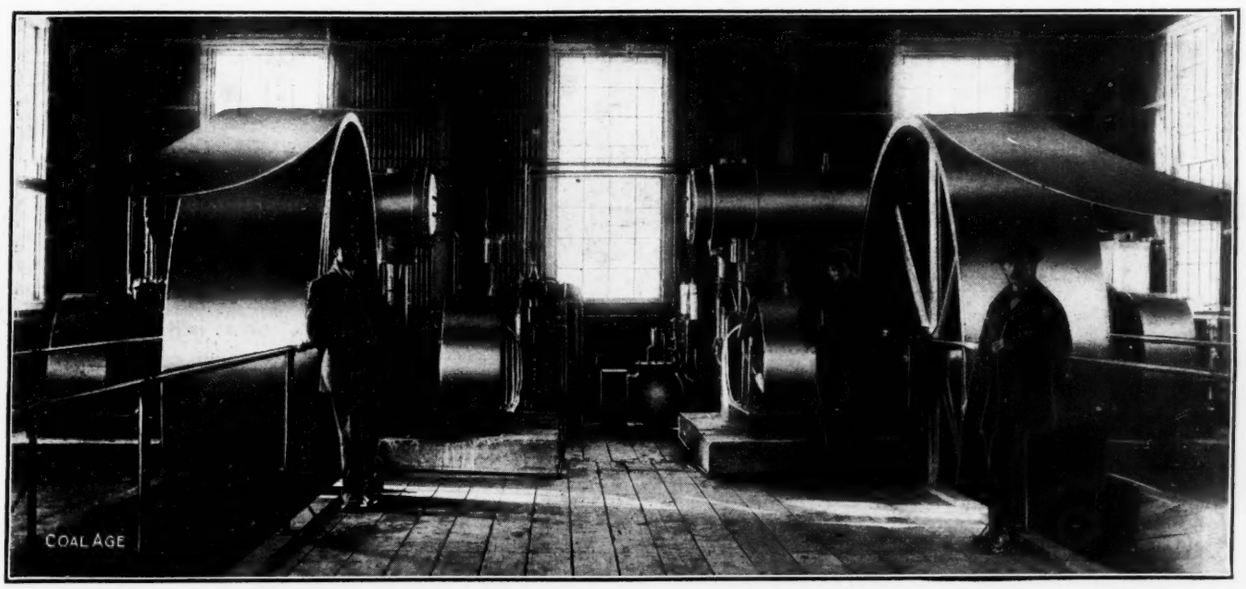
No. 7 Mine (Month of August, 1913)

Number of tons of coal produced.....	4,444.3
Number of kilowatt-hours consumed, mining machines, drills, pumps and electric hoist combined..	3,290
Ventilating fan.....	1,675
Haulage system.....	5,725
Total	10,680

Kilowatt-Hours Consumed per Ton Produced

Mining machines, drills, pumps and hoist.....	0.718
Ventilation	0.377
Haulage	1.29
Total	2.385

It is apparent that direct application of electrical power at the machines brings about great economy of current consumption. Furthermore, the plant at No. 7 mine requires no station operator, the motormen and blacksmith being selected to oil and operate the apparatus.



COMPRESSOR ROOM, SHOWING THE TWO BELT-DRIVEN UNITS

No. 7 mine produces coal on a much smaller scale than either No. 5 or No. 6, and has the consumption of current for haulage taken into consideration, whereas Nos. 5 and 6 require extra coal and the services of haulage engineers.

It seems, however, that the average machine man cuts less coal per day with an electric puncher than with an air puncher, owing to the fact that the former has only one speed of operation. The economy of energy, however, offsets this loss unless current sells at an extremely low price.

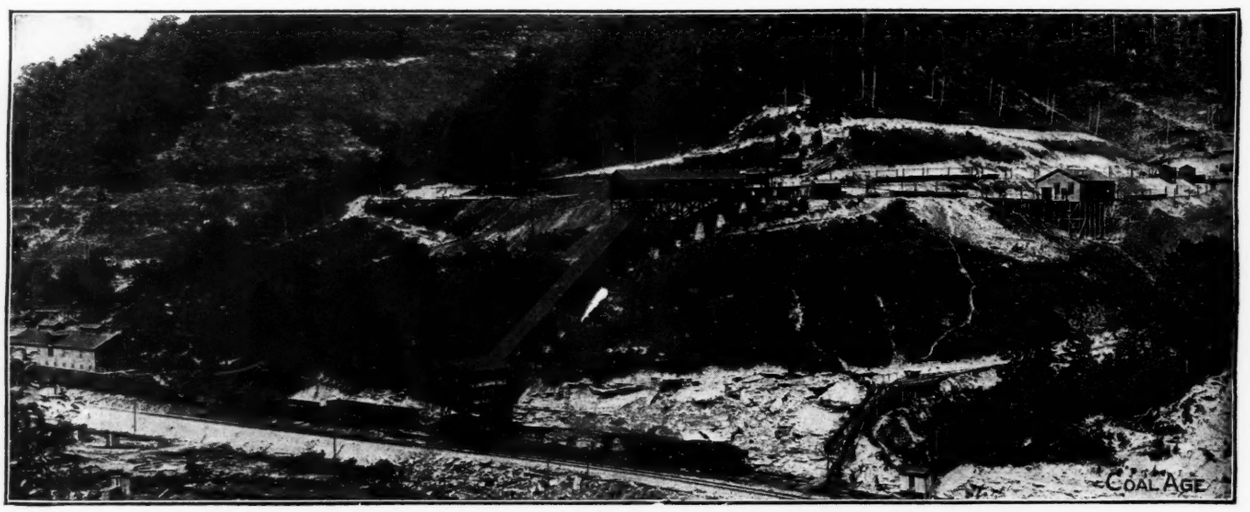
The electric drills in use at present give little trouble, but are rather heavy for fast work. A good electric drill that would penetrate sulphur balls without breaking the steel and that would not exceed an air drill in weight would be a boon to the coal miner and operator in places where sulphur balls are encountered and would greatly facilitate electric mining.

Development of the Jenkins-McRoberts District of Kentucky

By W. B. Webb*

SYNOPSIS—In spite of many obstacles in the way of transportation facilities, Jenkins and McRoberts in the Elkhorn field of Kentucky have risen from a wilderness to thriving and prosperous communities in less than three years.

One of the largest coal mining plants in this country is that of the Consolidation Coal Co. in the Elkhorn field of eastern Kentucky. Three years ago, eastern Kentucky, particularly the Elkhorn field was practically unknown. About that time the above mentioned company purchased approximately 100,000 acres lying largely in Letcher County along the tributaries of the Kentucky and Big Sandy Rivers.



The Surface Plant at No. 201 Mine

Development work was immediately undertaken in and about Jenkins. The nearest railroad upon one side was 100 miles away, and on the other, about 35 miles with rough country lying between. The Lexington and Eastern R.R. owned by the Louisville & Nashville system built an extension from Jackson south into the head waters of the North Fork of the Kentucky River, approximately 103 miles in length. On the other side the Chesapeake & Ohio constructed a branch along the Big Sandy River. The Baltimore & Ohio also constructed a branch road from Shelby Station, in Pike County, a distance of about 32 miles.

As soon as the railroad construction was well under way the building of McRoberts, which was to be its terminus, was commenced. Mills were installed in the forest, in which was manufactured the lumber necessary for the building of the miners' houses and other structures. A brick plant was also established, likewise a power plant of 10,000-kw. capacity. This latter supplies McRoberts, Dunham, Burdine and other nearby mining towns, besides half a dozen or more substations. This plant is now said to be the largest south of Mason's and Dixon's line.

This power plant furnishes power to the Elkhorn Mining Corporation, the Elkhorn Fuel Co., the Milwaukee Gas & Coal Co., and the Beaver Creek Coal Co., at Weeksbury and Wayland, some 30 miles distant, while lines are now being built into Van Lear, almost 70 miles away.

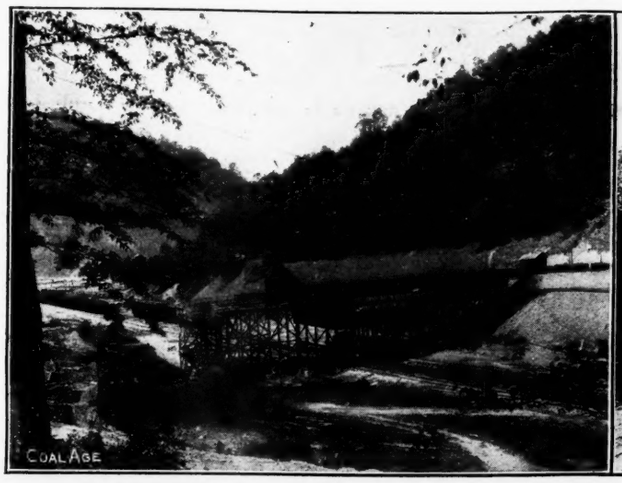
All the new towns of this company, including Jenkins, McRoberts, Durham and Burdine were remarkably rapid in their growth, especially when one considers the rough topography of the country, and the poor roadways over which it was necessary to haul much of the material and equipment. Thus practically all of the machinery entering into the power plant had to be transported over the mountains by wagon.

Only a portion of the acreage of the Consolidation Coal Co. is being developed by that firm itself, the balance being subleased to other operators. This company also has plants in the Somerset section of Pennsylvania, the Fairmount region of West Virginia, the George's Creek big vein region of Maryland, and some extensive operations in the Miller's Creek section of Johnson County, Kentucky.

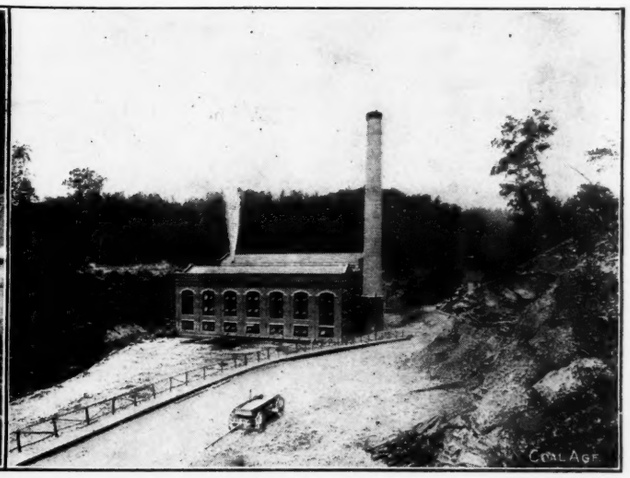
The Nicola Building Co., of Pittsburgh, Penn., built Jenkins and the other towns for this firm on contract, putting up 1600 houses in Jenkins alone, all of which were modern structures plastered inside. There were also many other buildings, houses, offices, stores, Y. M. C. A.'s, churches, school buildings, etc. There were also a bakery, ice plant and other structures, costing all the way from $25,000 to $70,000 each to be built, all of which work, as well as road building, was carried on by the Nicola company, with promptness and dispatch.

One of the principal ideas kept in mind by the Consolidation company in the development of this property

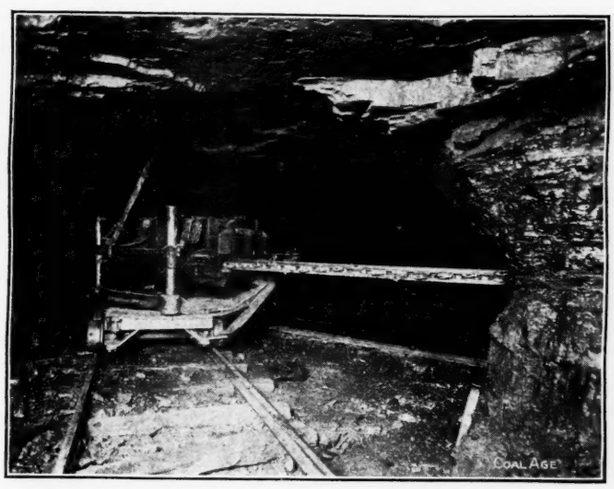
*Sergent, Ky.



TIPPLE FOR MINES NOS. 207 AND 208



POWER PLANT OF 10,000-KW. CAPACITY AT JENKINS



TYPE OF MINING MACHINE USED

was the interests of its employees. Almost as soon as any work was started at all, a Y. M. C. A. headquarters was established. This temporary beginning was later enlarged and finally a creditable permanent Y. M. C. A has been built. The mines of this section begin at No. 201 and go to 207. No. 201 is located at Burdine, 202 is between that point and Jenkins, while Nos. 203, 204 and 205 are located at the latter point. Nos. 206 and 207 are at Dunham, on the headwaters of Elkhorn Creek.

At McRoberts, the mines are Nos. 211, 212, 213, 214 and 215, while the same coal bed is worked as that at Jenkins. This seam is about 12 ft. thick, with thin slate partings. The roof is said to be perfectly safe, and thus far there have been no fatalities from falling slate.

At the present time, coal orders are coming in at an unusual rate, and increases in operating force are contemplated. At present about 160 cars, or approximately 7000 tons are mined per day. By the end of the year it is hoped that this amount may be doubled. This is believed quite possible, depending only on market conditions.

There are now something over 2000 men employed at the mines in Jenkins and McRoberts, exclusive of the office force, which comprises about 100 men and which will, of course, be increased as mining progresses.

Jenkins today has a telegraph and telephone system, electric lights, water-works, a national bank, a bakery, dairy, ice plant, a weekly newspaper, a city hospital, supply and machine shops, schools, churches, Y. M. C. A.;

A STREET IN JENKINS

THE JENKINS POST OFFICE, Y. M. C. A. AND DRUG STORE

in fact, almost everything which goes to make up a live, wide-awake city. Miners and others coming to Jenkins can educate their children as easily as they can in the large cities, since there is a large central school in a $30,000 building and five division schools, all supplied with competent teachers.

Rents in both Jenkins and McRoberts are reasonably low, and every inducement is given to tenants to save money for the proverbial rainy day. Hundreds of men are taking advantage of this, but there is here, as elsewhere, a shiftless, happy-go-lucky class, such as often frequents mining towns. These people are constantly on the move and do little good anywhere. It is believed, however, that there are inducements here that annot be found in any other mining community in the country.

We are indebted to William J. Flaherty, who kindly assisted in securing the photographs here presented, as well as the descriptive matter. Mr. Flaherty, who is one of the congenial office men, came to Jenkins when the first developments were started, and has consequently had an opportunity of seeing the town grow from a wilderness to its present status.

Texas Breaks Coal Records

The State of Texas mined in 1913, 2,429,144 short tons of coal, valued at $4,288,920, according to E. W. Parker, of the U. S. Geological Survey. This production was almost evenly divided between lignite and bituminous coal, with the balance slightly in favor of the latter.

Both classes of fuel showed increases in production, and both made their record output. The total production in 1913 exceeded that of the previous year by 240,532 short tons, or 11 per cent. in quantity, and by $633,176 or 17 per cent. in value. Most of the increase in tonnage was derived from the lignite mines, whose output showed a gain of 190,451 tons, the production of bituminous coal increasing 7081 tons. In point of value, however, the advantage was as much in favor of the bituminous coal as the gain in quantity favored the lignite. The value of lignite increased $123,971, while that of the bituminous product increased $409,205.

The coal beds of Texas belong to three distinct geologic systems—the Carboniferous, Cretaceous and Tertiary. The Carboniferous coals are found in the north-central part of the state, the principal mining operations being in Eastland, Palo Pinto, Erath, Wise and Young Counties. The Cretaceous coals occur near the southern part of the state, and are mined chiefly near Eagle Pass, in Maverick County. The coals of this district which extends into New Mexico and are mined extensively at El Fenix near Sabinas and at Esperanvas, are classed as bituminous coals, and in the southern portion of New Mexico make a fair grade of coke.

The lignite beds are of enormous extent and occur in a wide belt, which stretches from the Sabine on the north-east of the Rio Grande in the southwest. Like the Cretaceous coals these seem to improve in quality to the southwest, and near Laredo, in Webb County, the lignite is changed to a higher-grade coal approaching cannel in character and classified as bituminous. The principal lignite operations have been carried on in Anderson, Bastrop, Fayette, Henderson, Hopkins, Houston, Lee, Leon, Medina, Milan, Rains, Robertson, Shelby, Titus, Van Zandt and Wood Counties.

The development of the lignite resources of Texas began in the closing decade of the 19th Century and except for a temporary setback in 1902 and 1903, after the discovery of petroleum, has progressed steadily with the development and growth in population. Lignite is found to be an excellent fuel for the gas producer and the vast resources of Texas in this regard possess great potentialities for the future.

The first record of the production of bituminous coal in Texas is contained in the volume of mineral resources of the United States in 1884, which states that the quantity mined in that year was 125,000 tons. The total production of lignite and bituminous coal in 1913 was about 20 times the output of 1884.

Government Aids Coal Exporters

With a view to aiding the coal operators of the United States to expand their markets at a time when the exporters of other coal-producing nations are inactive, the Bureau of Mines has issued a bulletin describing the various coals of the country which are best available for foreign shipment. The bulletin, which is printed in Spanish, Portuguese and English, will be given special distribution among the large coal users and importers of South and Central America. That this important field is as yet slightly developed as a market for United States coals is shown by the statistics of coal exports. Of 16,083,101 tons of coal exported during 1913, but 450,000 tons went to South America. Canada was the best customer, taking 11,500,000 tons.

The bulletin lists as available for this promising export trade seven groups of coal fields. These are the Pocahontas and New River coals of West Virginia, with Norfolk and Newport News as shipping ports; the Maryland and eastern Pennsylvania coals, to go through Baltimore or Philadelphia; the Virginia, Kentucky and Tennessee coals, through Hampton Roads or Charleston; the Alabama coals, through Mobile or New Orleans; the western Pennsylvania coals, through New Orleans; the Illinois and Indiana coals, through New Orleans; and the Washington coals, through Seattle. The bulletin gives in detail the general characteristics of the various coals, and points out which are the best adapted to railroad use, manufacturing, gas-making or coke-making. Average analyses are given, and the heating values are expressed in British thermal units and in calories.

"Coals of excellent physical character and of high heating value are available for export," states the bulletin. "For this reason and because of the modern facilities at the collieries for properly grading large shipments, the American producers can export coals suitable for any kind of service. The transportation systems from the mines to tidewater and the coal-handling equipment for loading boats at the various ports are highly developed so that producers are able to give excellent service to foreign buyers. Enormous quantities of these coals have been used by railroads, manufacturing plants and seagoing vessels, and for household purposes. Much of the coal available for export is superior to that heretofore supplied to foreign users from other

Geology and Location of the Coal Fields of Pennsylvania

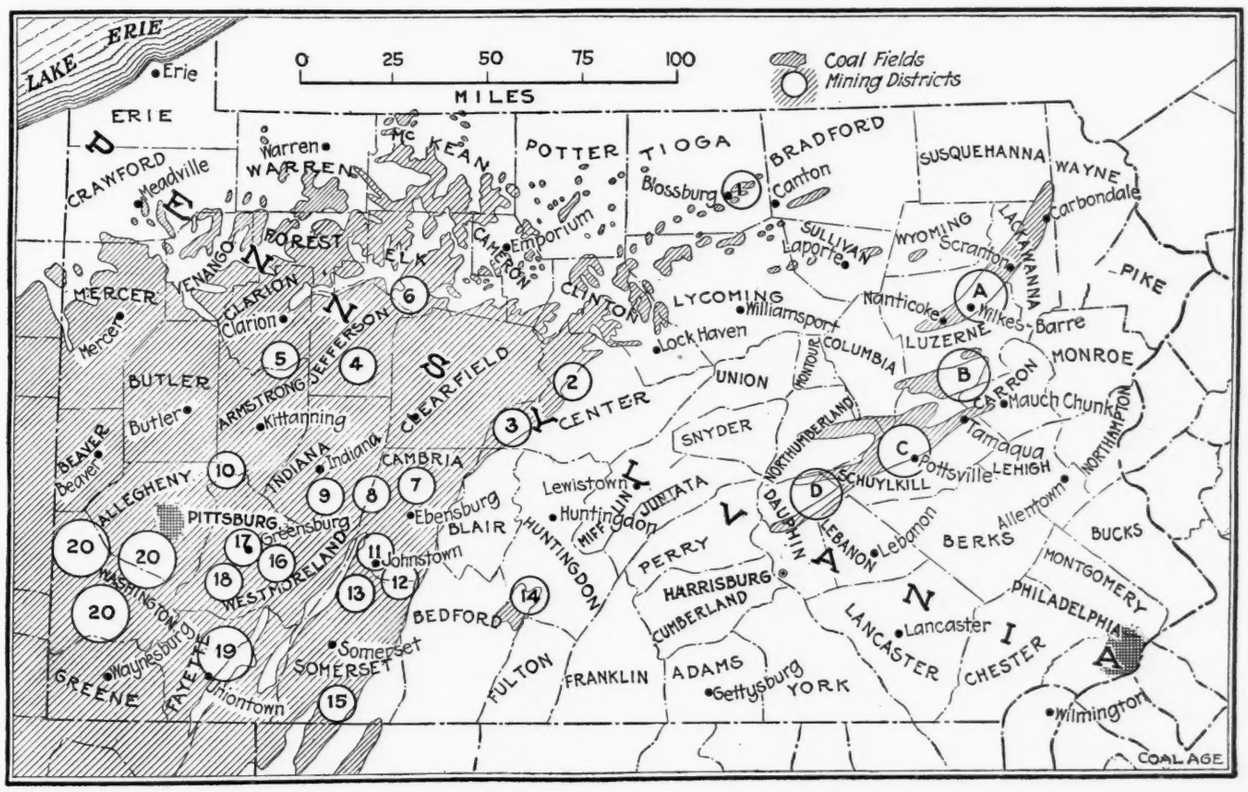
By J. S. Burrows*

SYNOPSIS—A geological classification of all the Pennsylvania coals with comments on their commercial importance. Also map showing location of the different fields. The uses to which the various coals are generally confined together with the railroads draining the districts are noted.

The accompanying tables and map covering the bituminous coal fields of Pennsylvania have been compiled with the object of providing, for convenient reference, a key to the coals of that state. While all of the best authorities have been consulted in preparing these data, the tables have been purposely limited in scope to the essential facts relative to the correlation, location and commercial importance of the coal beds.

Pennsylvania was the first state to have a systematic gelogical survey of its coal fields, the data obtained in the original survey having been augmented by later investigations of both the state and national government; as a result the distribution and correlation of the coals are considered to be accurately determined.

*Fuel expert, Castner, Curran & Bullitt, Inc., Norfolk, Va.



Coal Areas of Pennsylvania and Location of the Different Districts

Map No.	Name of District	Railroads	Bituminous Districts Kind of Coal	Principal Uses of Coal	Index Nos. Important coal beds
1	Blossburg	Erie-NYCRR	Semi-bituminous (c) (low volatile)	Smithing	3-4-6
2	Snowshoe	PRR	Semi-bituminous (low volatile)	Smithing and steam	6-8-9
3	Clearfield	PRR-NYCRR	Semi-bituminous (low volatile)	Steam, bunker, railway and coke	6-8-9
4	Reynoldsville	BR&PRR-PRR	Bituminous (d) (medium volatile)	Steam and railway	6-9
5	Low Grade Division	PRR	Bituminous and cannel (e) (high volatile)	Steam, railway and domestic	6-8-9
6	Shawmut	PS&N	Bituminous (high volatile)	Railway, steam and domestic	5-6-9-10
7	Cambria	PRR NYCRR	Semi-bituminous (low volatile)	Steam, bunker and coke	6-8-9-10
8	Two Lick	PRR (a)	Semi-bituminous (low volatile)	Steam, bunker and coke	6-8-9-10
9	Indiana	PRR	Bituminous (high and medium volatile)	Coke and steam	6-8-9-10
10	Alleghany River	PRR	Bituminous (high volatile)	Steam and domestic	6-8-9-10
11	Johnstown	PRR	Semi-bituminous (low volatile)	Steam and coke	6-8-9-10
12	Southfork Windber	PRR	Semi-bituminous (low volatile)	Bunker and steam	6-8-9-10
13	Quemahoning	B&ORR	Semi-bituminous (low volatile)	Steam	6-8
14	Broadtop	PRR (b)	Semi-bituminous (low volatile)	Steam and coke	3-4-6-10-11
15	Meyersdale	B&ORR	Semi-bituminous (low volatile)	Steam	10-13½-14-16
16	Latrobe	PRR	Bituminous (high volatile)	Coke, steam and railway	16
17	Greensburg	PRR	Bituminous (high volatile)	Coke, steam and railway	16
18	Youghiogheny	PRR	Bituminous (high volatile)	Illuminating gas, coke and steam	16
19	Connellsville	PRR-B&ORR	Bituminous (high volatile)	Coke	16
20	Pittsburgh	PRR&B&ORR	Bituminous (high volatile)	Steam, railway, coke and domestic	16-18

Anthracite Regions

A. Wyoming B. Lehigh C. Schuylkill D. Lykens Valley

Notes—(a) Cherrytree and Dixonville Ry. (b) Huntington & Broadtop RR. (c) Low volatile—12 to 22% volatile matter. (d) Medium volatile—22% to 30% volatile matter. (e) High volatile—over 30% volatile matter.

The Bituminous Coals of Pennsylvania

Index Number	Series	FORMATIONS	NAMES OF COAL BEDS	LOCAL NAMES OF COALS	COMMERCIAL IMPORTANCE
26	Permian (Dunkard)	(Upper Barren) XVI Greene	Ninevah		Commercially unimportant.
25			Dunkard		Commercially unimportant.
24	Pennsylvanian (Upper) Carboniferous System	(Upper Barren) XV Washington	Jollytown		Commercially unimportant.
23			Washington		Mined to some extent in Washington and Greene Counties.
22			Waynesburg B.		Commercially unimportant.
21			Waynesburg A.		Commercially unimportant.
20		(Upper Productive) XV Monongahela	Waynesburg		Best development in portions of Greene, Washington and Westmoreland Counties where it is mined for local use.
19			Uniontown		Important only in Fayette and Washington Counties and not extensively mined.
18			Sewickley	(Mapletown in Washington and Greene Counties)	Best development along Monongahela River in Greene County where it is extensively mined and used locally as a high grade domestic fuel.
17			Redstone		Of little value and probably affected by extraction of underlying Pittsburgh coal.
16			Pittsburgh		The most uniform in quality and thickness and, for a given area, the most valuable coal bed in the bituminous coal field of Pennsylvania. It is estimated that this bed originally contained more than ten billion tons of available coal. The main body of the coal lies in the southwestern corner of the state, embracing the whole of Greene and Washington Counties, and extending east into Fayette County and north into Allegheny County. There are several large areas in Westmoreland County and isolated patches in Somerset and Indiana Counties. The Pittsburgh coal is the source of the famous Connellsville coke and the Youghiogheny gas coal. It is extensively mined except in the center of the Greene-Washington County area where the bed lies deep below the surface. More than half of the coal produced in the state comes from this bed.
		(Lower Barren) XIV Conemaugh		(Painter in Westmoreland County)	A variable unpersistent bed occurring in the top of this formation, and mined locally in Westmoreland County.
15			Little Pittsburgh		A commercially unimportant thin bed having a wide extent in Greene, Washington, Fayette, Westmoreland and Somerset Counties.
14			Elk Lick		A commercially unimportant variable bed of workable thickness in Somerset County and formerly mined in Fayette and Westmoreland Counties.
13½				(Berlin in Somerset County)	Although this coal has not been correlated with any of the well known coals, it is the most valuable bed of the Berlin district in Somerset County where it is extensively mined for shipment.
13			Bakerstown	(Price in Somerset County)	Mined to some extent in Allegheny County and correlated with the Price coal of the Berlin district in Somerset County where it underlies a large area, and is one of the most important coals.
				(Coleman in Somerset County)	Furnishes a small amount of coal in the Berlin district of Somerset County.
				(Philson in Somerset County)	This bed which has not been correlated is mined to some extent in the Berlin district of Somerset County.
12			Masontown		Commercially unimportant.
11			Gallitzin (*Mahoning*)	(Spear in Bedford and Huntingdon Counties) (Brush Creek and Millerstown in Butler County) (Brush Creek in Lawrence County)	Commercially unimportant except in Broadtop field of Huntingdon and Bedford Counties.
10		(Lower Productive) XIII Allegheny	Upper Freeport	(E) (Lemon and Cokeyard in Cambria County) (Kelly in Bedford County) (Sawmill along Pa.-Md. line) (Represented in Beaver County by 4-foot and 5-foot beds) (Cap seam in Clearfield County) (Connellsville in Greene County)	One of the most important coals and source of great production. Extensively mined as the Kelly bed in Bedford County. Principal source of coal along Kiskiminitas River in Armstrong County. Most important coal in Indiana County, and next to the Lower Kittanning bed, the most valuable coal in Cambria County. Extensively mined in Westmoreland County, and has a large area and is mined to some extent in Somerset County. The important coal mined as the E seam in Lycoming County is regarded as belonging to this horizon.
9			Lower Freeport	(D) (Moshannon in Clearfield and Center Counties) (Limestone in Southern Cambria County) (Schantz and No. 5 in Butler County)	Chief coal of Clearfield County and the source of an enormous output in the following districts: Reynoldsville, embracing portions of Jefferson, Indiana, Clearfield and Elk Counties; Phillipsburg-Houtzdale, embracing portions of Clearfield and Center Counties, Punxsutawney, of Jefferson and Indiana Counties; and the Patton-Barnesboro district of Cambria County.
8			Upper Kittanning	(C') (Darlington and North Washington cannel in Beaver County) (Woodland cannel in Clearfield County) (Middle or Big bed in Center County) (Cement in southern Cambria County) (Cement or Rock vein in Somerset County) (No. 4 and creek vein in Butler County)	One of the important sources of coal and the horizon of the Pennsylvania cannel coals. Principal coal, as the Big bed, of the Snowshoe district in Center County. It is one of the principal coals of Somerset County, extensively mined about Johnstown in Cambria County, and is largely workable throughout Butler County.
				Gorman	Commercially unimportant.
7			Middle Kittanning	(C) (Twin seam-?-in Bedford and Huntingdon Counties)	Generally too thin and dirty for mining, though worked at a number of points for local use. It is found in its best condition and development in the northern and eastern portions of the main field.
6			Lower Kittanning	(B) (Miller or Sonman in Cambria County) (Dagus or Daguscahonda in Elk County) (Bloss- -in Tioga County) (Barnet in Bedford and Huntingdon Counties)	Next to the Pittsburgh bed this coal is the most persistent, uniform and reliable bed in the bituminous field of Pennsylvania. The zone within which it lies includes nearly one-half the entire area of the main coal field. It is exposed in workable thickness in Armstrong, Jefferson, Indiana, Clarion, Center, Clearfield, Cambria, Blair, Somerset, Fayette and Elk Counties. The principal mining operations are in Center, Cambria and Somerset Counties. As the Barnet bed of Bedford and Huntingdon counties, it is the most important coal of the Broadtop field.
5			Clarion	(A') (Pardoe-?- in Mercer and Butler Counties) (Clermont-?-in Elk, Forest and McKean Counties (Scrubgrass in Clarion, Venango and northern Butler Counties).	Of little commercial importance except in the vicinity of Clermont in McKean County.
4			Brookville	(A) (Pardoe-?-in Mercer and Butler Counties) (Clermont-?-in Elk, Forest and McKean Counties) (Cook or Fulton in Huntingdon and Bedford Counties) (Cushman or Seymour in Tioga County)	Of little commercial importance but mined to some extent along eastern margin of main coal field and in the Broadtop field of Huntingdon and Bedford Counties. It is of workable thickness in Jefferson, Clearfield, Center, Cambria and Somerset Counties.
3		(Seral Conglomerate) XII Pottsville	Mercer Group	(Upper and Lower Mercer) (Upper Middle and Lower Alton in McKean County) (Mt. Savage along Pa.-Md. line) (Gaines in Potter County) (Bloss in Tioga County) (B-?-in Lycoming and Bradford Counties) (Bear Run in Blossburg basin) (A'-?-in Bernice basin)	Generally lacking in persistence, but locally important group of coals, and the principal source of fuel in McKean County where the Upper, Middle and Lower Alton beds are extensively mined. The most important coals of Potter, Lycoming and Bradford Counties belong to this group. The Bloss coal of Tioga County, the B coal of Lycoming County, the Bear Run coal of the Blossburg basin, and the A coal of the Bernice basin are considered by some geologists as belonging to this group.
2			Quakertown		Commercially unimportant.
1			Sharon	(Block) (Quakertown-?-in Warren County) (Upper Marshburg in McKean County) (Railroad seam along Pa.-Md. line) (Mehoopany in Wyoming County)	Commercially unimportant but formerly extensively mined in Mercer County.

Pennsylvania First to Correlate Its Coal Seams

As Pennsylvania was the first state to correlate its coal seams and adopt official names for them, these names have been accepted as a standard to which all the Carboniferous coals of the country are referred.

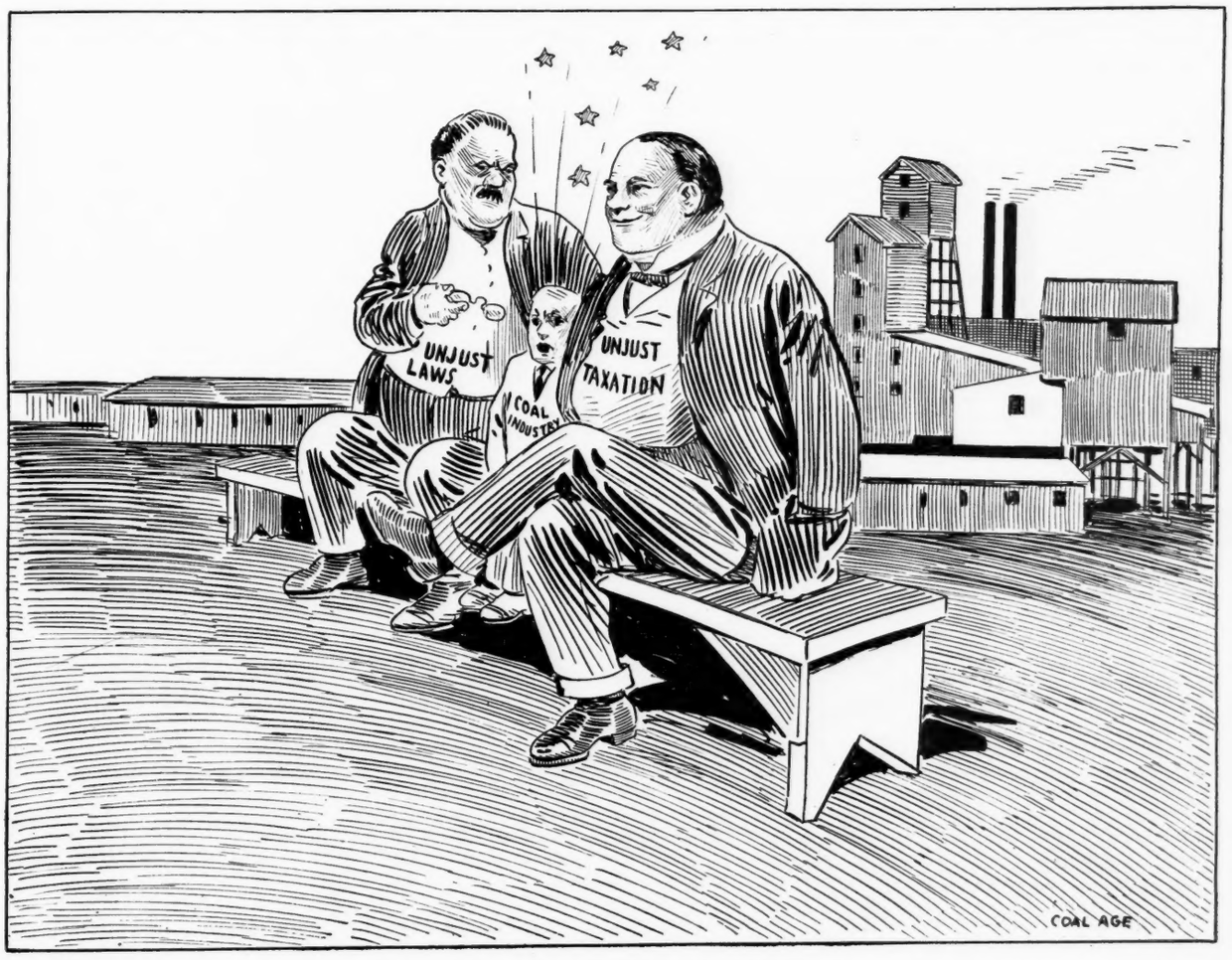
The table of bituminous coals covers all of the seams found in Pennsylvania, from the lowest shown at the bottom consecutively up to the highest known coal in the state. Under the column headed "Formations" is shown the division of the coal beds into the distinct geologic formations which have been recognized. The old formation names are shown in parentheses and the official names in bold-face type. The Monongahela and Alleghany formations are by far the most important, and yield nearly all of the coal mined in this state.

In the column headed "names of coal beds" is shown the official names of the coals while the adjoining column shows the more important local names applied to these coal beds in different districts.

The column of index numbers refers solely to a similar column in the table of mining districts for the purpose of locating the more important coals being worked in the mining districts of the state. They have no official connection with the names of the coals. In the first column of the table of mining districts will be found a series of numbers which refer to the numbered circles shown on the map indicating the important mining districts of the state.

Pennsylvania is the leading coal mining state of the Union. Besides embracing the only anthracite deposits of importance in this country, it stands first in the production of bituminous coal. The entire anthracite industry is confined within a small area of 480 square miles in the eastern half of the state.

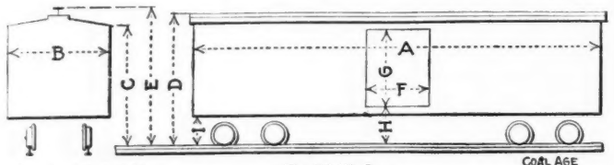
The bituminous field occupies the greater portion of the western half of the state, and forms a part of the Appalachian coal field which extends southward into Alabama, across the intervening states. The area of this great coal field, lying within the state of Pennsylvania is 14,200 square miles, and the available supply of coal remaining in the ground has been estimated by the U. S. Geological Survey as approximately 108½ billion short tons. This amount of coal would supply the entire United States, at the present rate of consumption, for a period of approximately two and one-quarter centuries. The bituminous fields contribute about one-third of the total coal production of the United States, more than 95 per cent. of which is mined in the districts shown on the accompanying map.



Squeezing Him If He Is Not Careful

Required Clearances for Freight Cars

In the designing of structures adjacent to or straddling railroad tracks, it is most important that the maximum clearances required for the class of equipment



A = Length Outside
B = Width at Eaves or Platform
C = Height, Rail to Eaves
D = Height, Rail to running Board
E = Height over All
F = Width Door
G = Height Door
H = Height from Rail to Door
I = Height from Rail to Floor
For flat Cars D is height from Rail to Top of Platform

DIAGRAM OF FREIGHT-CAR MEASUREMENTS

used, be accurately determined. Data of this kind are frequently difficult, if not impossible to obtain. As a result it often happens that expensive alterations are necessary on construction work of this character.

Not only is it necessary to anticipate the kind of railroad cars it is expected to load at the plant under consideration, but due attention must be given to all kinds of equipment which are liable to pass over the tracks in question. It is often the case that the very largest kind of a car may be shunted into a mine siding during the process of switching operations. Where such a contingency is liable to arise, it is obvious that due preparations must be made for it. The accompanying table and sketch, taken from the *Iron Trade Review*, gives the principal overall dimensions of various types of cars on the American railroads. Even though the list is necessarily incomplete it may be taken as typical and will be of material assistance to designers of mine structures.

TABLE SHOWING PRINCIPAL DIMENSIONS OF FREIGHT CARS

Road and Type of Car	A Ft.	A In.	B Ft.	B In.	C Ft.	C In.	D Ft.	D In.	E Ft.	E In.	F Ft.	F In.	G Ft.	G In.	H* Ft.	H* In.	I* Ft.	I* In.	Capacity Cu.Ft.	Capacity Lb.
Pennsylvania; box	36	4	9	10¼	11	8	12	4⅝	13	0⅛	5	4	6	7¾	3	11	3	6	1,981	60,000
Pennsylvania; produce	38	6	9	10	12	0¾	12	8⅝	13	9	4	2	6	1¾	..	..	..	..	2,091	100 000
Pennsylvania; furniture	41	11¼	9	11¾	12	3¼	12	10⅞	13	6¾	6	6	8	0	2	6	3	4	2,923	60,000
Pennsylvania; furniture	36	4	9	10¼	11	7½	12	4⅜	12	10¼	5	4	6	7¾	..	..	..	..	1,981	80,000
Pennsylvania; automobile	38	6	9	6¼	12	7⅝	13	4 1/16	13	10 1/16	12	2	8	4½	..	..	..	..	2,650	100,000
Penn.; gondola-bottom hopper	33	0	10	1½	..	...	3	6	10	7¼	..	..	.	...	..	..	..	..	1,672	100,000
Pennsylvania; flat	40	2	9	3	..	...	3	10⅛	6	7⅜	..	..	.	...	..	..	..	..	371	100,000
Pennsylvania; gondola, long	52	0	9	10¾	..	...	3	4¾	7	3⅛	..	..	.	...	..	..	..	..	1,452	140 000
Pennsylvania; box	38	6	9	10	12	0¼	12	8⅝	13	2⅝	6	0	7	5¼	..	..	..	..	2,448	100,000
N. Y. Central; box	34	0	9	3¾	10	6½	11	4¼	13	1½	5	0	5	9½	4	0	3	6	1,670	50,000
N. Y. Central; refrigerator	37	5	9	6	12	1	12	10	14	0	5	0	5	10	..	..	..	..	1,707	50,000
N. Y. Central; stock	37	0	9	8	11	7½	12	4	13	5	5	0	6	9	..	..	..	..	2,142	60,000
Lehigh Valley; automobile	43	9¼	9	8⅝	12	7⅜	13	4⅜	13	9¾	12	0	8	2¾	..	..	..	..	2,950	60,000
Lehigh Valley; box	34	10¼	9	4½	11	6	12	3	12	11⅛	5	7½	7	0½	..	..	..	..	1,904	60,000
Lehigh Valley; carriage	46	5	9	8¾	13	0	13	9¼	14	1	8	8¾	8	6½	..	..	..	..	3,040	40,000
Lehigh Valley; stock	38	2	9	5½	12	0	12	9	13	6	5	3¼	7	5	..	..	..	..	2,406	50,000
Lehigh Valley; gondola, wood	25	9½	..	...	5	0	..	...	6	8	..	...	.	...	..	..	..	..	227	40,000
Lehigh Valley; cinder	36	0	..	...	7	11	..	...	6	6½	..	...	.	...	..	..	..	..	1,273	80,000
Erie; furniture	50	7¼	9	10⅛	13	10⅜	14	7⅞	14	7⅞	10	0	9	5	..	..	..	..	4,532	80,000
Erie; box	34	8⅜	9	3½	11	7¾	12	7	13	3½	5	7	6	5	4	2	3	4	1,927	60,000
D., L. & W.; box	34	10½	9	4	11	7	12	3	13	1	5	6	6	8½	..	..	..	..	1,913	60,000
D., L. & W.; stock, double deck	36	10½	9	5½	12	1	12	9	13	5½	5	0	3	3	..	..	..	..	2,327	60,000
D., L. & W.; hopper	30	9	10	1	10	0½	..	...	10	8	..	...	.	...	..	..	..	..	1,680	100,000
Cent. R.R. of N. J.; box	34	10	9	7	11	7	12	5	12	10	5	6	6	6	..	..	..	..	1,994	60,000
Cent. R.R. of N. J.; refrigerator	34	3	9	8	12	4	13	1	13	8	5	0	5	9½	..	..	..	..	1,747	40,000
B. & O.; furniture	40	6	9	6¼	12	3⅛	13	0¼	13	9⅞	6	0	7	11¼	3	6	3	1	2,321	50,000
Pere Marquette; box	40	0	9	11	12	0	12	3	13	0	5	10	7	4	..	..	..	..	2,562	50,000
Rock Island; furniture	51	6	9	10	13	4	14	0	14	0	11	10	8	10	..	..	..	..	4,037	60,000
Rock Island; gondola, steel	38	0	10	1	..	...	..	...	8	8	..	..	.	...	..	..	..	..	....	100,000
Great Northern; hay	33	0	9	2	12	0	12	9½	12	10½	5	0	7	4	4	1	3	3	1,983	40.000
Northern Pacific; lumber	41	0¾	9	8½	..	...	13	3⅝	14	0½	5	6	8	3½	..	..	..	..	2,990	80,000
Southern Pacific; automobile	41	1 1/16	9	10	14	0⅛	14	11⅛	15	6 1/16	9	8½	9	5½	..	..	..	..	3,670	100,000
Southern Pacific; box	41	10	10	0	13	3 1/16	14	1 1/16	14	7¾	6	0	8	8⅞	..	..	..	..	3,370	100,000
Atchi., Top. & S. Fé; furniture	34	9	9	10	11	7	12	1½	13	8	5	2	6	7	..	..	..	..	....	50,000
Atchi., Top. & S. Fé; coal and coke	34	0	9	10	12	2½	11	10	13	3	..	..	.	...	..	..	..	..	....	44,000
Mo., Kas. & Tex.; refrigerator	42	4½	9	9½	12	1¾	12	10½	14	0	4	0	6	2	..	..	..	..	1,972	60,000
Norfolk Western; box	36	1	9	6½	11	5⅛	12	4⅛	13	3½	5	6	6	3½	..	..	..	..	1,896	50.000
Norfolk Western; flat	33	6	8	3½	4	4¼	7	1½	..	...	..	..	.	...	..	..	..	..	3,458	100,000
Norfolk Western; coke, steel	42	0	10	0	13	6	..	...	13	6	..	..	.	...	..	..	..	..	3,458	100,000
Merchant Despatch; refrigerator	36	1¾	9	9	12	2¾	13	1	14	1½	5	0	5	8¼	4	2	3	6	1,829	60,000
Canadian Pacific; horse	47	1⅜	9	9	12	2¾	13	3½	13	3½	5	0	6	9	..	..	..	..	2,036	24.000
N. Y., N. H. & Hartford; auto	38	6	9	7	12	6⅝	13	2	13	10	6	0	7	7	..	..	..	..	2,448	80,000
Boston Maine; ice	37	1	9	4	12	7⅜	..	...	13	11⅝	5	8	7	7	..	..	..	..	2,371	60,000
Boston Maine; grain	36	9¾	9	7⅜	12	0	13	3¾	13	11⅝	6	0	7	10⅞	..	..	..	..	2,460	60,000
Max. dim. taken from dif. cars	60	11⅝	10	7	14	11¼	15	7¼	15	7¼	12	2	9	10	4	2	..	..	....	110,000

*Approximate.

Coal in Eastern Montana

An account of an area of workable coal recently examined by G. S. Rogers, of the U. S. Geological Survey, in the northern part of Big Horn County, Montana, three or four miles from Waco, on the Northern Pacific Ry., has recently been published.

The coal-bearing area lies on Pine Ridge between Yellowstone and Big Horn Rivers, at the head of Mission and Sorrel Horse Creeks, beginning about 8 miles southeast of Custer, and capping the ridge for 6 miles.

The coal is of a good sub-bituminous grade. In physical appearance and stocking quality, it is described as superior to the coal mined near Sheridan, Wyo., but somewhat inferior to the Red Lodge and Bearcreek coals.

No development has taken place, but from samples procured in adjoining areas to the east, it is concluded that the Pine Ridge coal will prove to have a heat content in excess of 10,500 B.t.u. The bed has a thickness of more than 30 in. throughout the area of 5 or 6 miles, and is more than 3 ft. over much of this territory, attaining at one point a thickness of 4½ ft. In the northern part of the area the coal is much affected by faulting, but the best fuel is not disturbed.

It is estimated that more than 20,000,000 tons of coal underlie the field examined, of which at least 60 per cent. is recoverable. It is possible that other fields south and west of the district examined, are also underlain with workable deposits.

This report is published as Bulletin 541-H, a copy of which can be obtained on application to the Director of the Geological Survey, Washington, D. C.

In rebonding old tracks, it is often advisable to use exposed bonds, since if the splice bars are removed from the old rails, the bolts frequently have to be cut, and it is often impossible to draw the plates back into their original space.

An Unusual Underground Organization

By G. S. Brackett*

SYNOPSIS—During the past few years the small coal mine is the only one that has been making any money. The results obtained by reorganizing a large mine into practically a collection of little ones have been decidedly encouraging.

It has been a common maxim, during the recent years of small net earnings in coal production, that the only mines showing a reasonable margin of profit are the small ones with an output of 100 to 200 tons daily and a correspondingly small acreage.

These mines are worked by pick mining, without power equipment, and a short haul on the mine stock due to the small field of coal. The virgin tonnage is not sufficient to permit of much outlay in capital for the installation of any machinery; the long main heading and expensive track over which hundreds of acres of coal must be moved are replaced by short room headings, some feeding direct to the pit mouth.

To assume conditions in the smallest of these mines, the drivers coming to the tipple probably dump their own cars, and return to the mine with the same empties, and the only necessary outside laborers are the trimmers on the railroad car. Probably the foreman is the blacksmith, and the mine-track work is done under his supervision by the drivers after the miners have cleaned up, which, in a pick mine, usually occurs early.

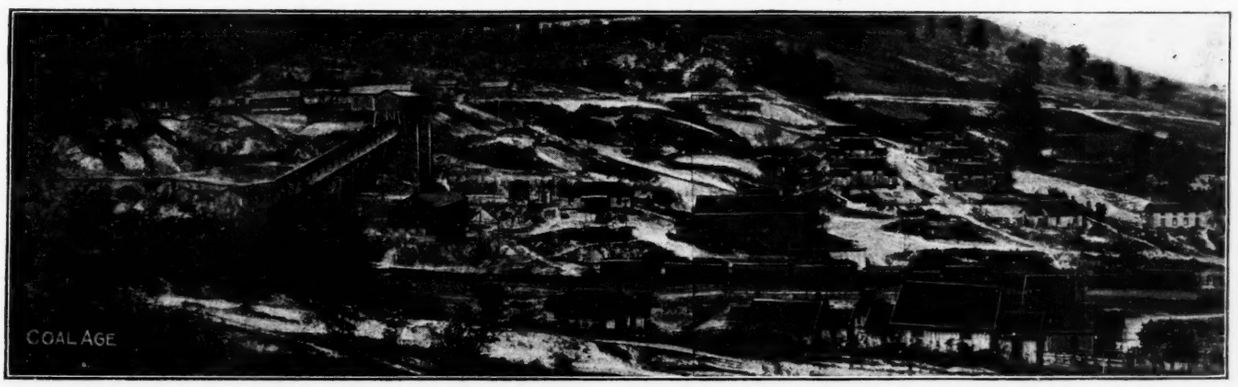
Pick mining gives less trouble with falls of roof, there are no wiremen, power-house employees or expensive salaried men; only a small equipment of mine cars is required, and these are not subjected to the unusual strain of motor haulage, and the mine-supply account is a small item. The coal is sold through a regular dealer and one of the firm or partners keeps the accounts.

There is a growing partiality among miners for piel mining and labor shortages are rarely felt in these small operations, especially if "solid shooting" is permitted as it is in many such cases. The delivery costs are small, and the net earnings correspondingly large but the proposition of tenfold production and tenfold profits looks extremely attractive. The larger mines, however, rarely work out in this direct proportion.

The object of this article is not so much to complain of the conditions existing in the coal-mining business, as to give the results of a radical change made in the underground organization of the employees of the Pittsvein Coal Co., so that many of the difficulties met with in larger mines are eliminated and the production costs brought down to a point more in competition with the smaller mines and their efficient labor.

The Disadvantage of Growth

The small mine has increased its tonnage, the haul has become so long that an electric motor has been installed together with a power house, the track relaid with heavier steel and heavier ties. The mine cars and track need constant attention. There is a complete tipple force, and instead of paying the drivers a little extra for track work we have regular track men. The stage is reached where the foreman is a foreman only and the superintendent is created.



Mining Plant and Town of Pittsvein Coal Co., at Flemington, W. Va.

Some of the headings pass through local dips and pumps and pumpmen are required. The cost per ton is considerably higher than in the small mine, shut-downs are expensive since much underground work needs doing, and the power house must be kept running. The expenses of monthly men are also high.

A reasonable economy is the installation of electric cutting machines to reduce the cost of the coal on board the mine cars at the working face. Most of the miners quit because they do not like machine-cut coal, and those that stay are continually complaining and "bucking" the mining machines. The tone of the mine is contention and dissatisfaction—it is difficult to get sufficient miners and those that are obtained are of the poorest class. The timbering is bad, the falls frequent, the rock expense high and accidents are numerous.

The production does not meet the expectation of the owners and the profit has gone entirely to the other side of the ledger. There are pump men, wire men, track men,

*Pittsvein Coal Co., Flemington, W. Va.

assistant foremen, boss drivers, rock men, timber men, carpenters, blacksmiths, trappers—each and every one out for his day's wages only, and determined to do nothing that is not compulsory. The trackmen will not fix a wire, nor open a ditch; the drivers will not clean a switch, the rock men will not set a timber and the timber men will not start a pump. That is, they will not unless the boss happens to be there and tells them to.

The boss' or the assistant's hands are full keeping in touch with these little things—he makes his rounds daily and finds that a "turn" is needed in the third left heading and a crosscut switch on the sixth right. He hunts up the trackmen and sends them to the third left with instructions to go thence to the sixth right. Any mining man knows what happens—the tool house must first be visited, a bite to eat, hunt the spikes, the bender, forget a hammer and there is always one who must fix his carbide lamp just as the rest are ready to start.

The worst of it is that the same thing happens on the return trip and continues *ad infinitum*.

Piles of spikes are left wherever a job is finished, insulators are abandoned in roof and rib, timbers are scattered over the mine; rails, switches, frogs are found any place. Each pile of wasted material acts as a silent instructor to all employees to continue to waste. All the men will pass over or by a place that needs fixing time and time again, leaving it for somebody else to repair. The first idle day there is work to do all over the entire mine and the shut-down will cost as much as a full day's run.

The drivers do not haul half the coal they ought, all the work is inefficient and the maintenance and repairs fall behind. These conditions might be an exageration but they pertain in part in all mines, and the bigger the mine the more pronounced. The cost of production goes up—up—up.

Revert to Simplicity

What is the logical relief? Get back to that simple organization, where a large mine is an aggregation of a number of small mines, where every employee sees the man in charge of his work several times daily, and the man in charge has a territory so small that he can keep track of every spike, rail, timber and tool and know every fall, every shot and every trip the drivers make.

He visits the working places several times a day, examines and directs as to timbers and roof, fixes a pump, opens a ditch or hangs a piece of wire. He has time to help with a fall, to help with a crown timber, and (most of all) to know and work with his men; to teach them and prevent accidents.

The mine at which this experiment in organization was made is in West Virginia, where the State Department of Mines is increasing its demands, restricting certain practices, and insisting that there is someone personally responsible for most of the accidents. The injured man should have had props in his working place, his roof should have been examined more frequently by the foreman or a safety prop should have been set. The injured man was not experienced enough to be expected to use the necessary precautions.

Entirely aside from the state law, these statements cause the foreman and superintendent some pangs of conscience. Could life be saved in the mine if more careful supervision was enforced—and can this supervision be given without prohibitive extra cost?

The local conditions at the mine in question are worse than the average, the roof is draw slate, heavy and treacherous, the local dips and drainage difficult, clay veins are frequent and labor is a little below the average in quality and experience. Assistant foremen were necessary for rather smaller tonnages than usual. Even with this aid it was almost impossible to visit the working places with the proper care and give the proper attention to the drivers and day men without a prohibitive cost.

These conditions vary greatly in different mines, some requiring more attention than others; but the difficulties constantly arising in this particular mine made an unusual amount of attention necessary, both on account of the irregularities in the working places, and the effort to prevent accidents from the dangerous roof.

Small Sections Were Created

In revising the organization the mine was divided into sections, each working 15 to 30 miners and an adequate number of drivers hauling to an independent motor side track. The foreman's assistants were disposed of, the track gang, pumpmen and brattice men discontinued; and each section given into the entire charge of an energetic practical coal miner, one who could lay a switch, string electric wires, had some ability in handling men and was a good timber man.

It is not difficult to pick out one such man in every 25 to 30 employees. His wages were based on hours, an increase being given over ordinary track rate so as to make the job worth working for. He can cover his territory carefully twice daily and still have ample time for other duties. He does a great deal of track work, timber work, and rock work himself.

This man's efficiency is based on the following points: Lack of accidents; cost of his tonnage at side track; salvage of used material of all kinds; conditions of track, timbering, brattices and drainage; enforcement of state mine law and company rules.

This small section is his own mine, his own responsibility and it is all close to his hand, with his tools and mine material convenient. He looks after his own pump, his own drainage and ventilation. He has authority to allow day time to a miner for helping clean a fall or build a brattice, and is usually present himself to help with the work.

He is busy, just as was the mine foreman of the small mine, but his work is compact and his job worth holding as he has taken a step above common labor. He gets help from a driver who has finished early, or from a loader out of coal; and in the larger sections he has one regular track man.

He knows every inch of his section, every prop, every wood rail, every bad track joint; he has in his mind all the little jobs that need attention and is in so close touch with all the men that these little jobs get done at odd times while the mine is running. Timbering rules and regulations are enforced and the drivers do not "soldier" the latter part of the day for a car or two they are expecting to get.

There is no time lost by the inside labor traveling diagonally across the entire mine and back. If a car is off the track, this individual is close at hand with a jack and the coal continues to come. If there is a fall on the heading he is not far away and drivers and miners alike are soon at work and the road cleared.

The personal interest exhibited by the men in their own sections and the rivalry between these sections are what produce the results. The work is done, and should the mine lie idle we are not faced with intolerable conditions and unbearable expense.

The section men are worth taking care of during shutdowns, they are the only expense incurred, and each will have some improvements to make in his own section, or they may combine and lay some heading track, or attend to some main drainage.

On the mine foreman rests the success of the system to its last degree or refinement. He has time in making his rounds of inspection to give every little detail of economy and safety his close attention; and he must inspire and maintain in the section men the desire to produce coal on an economical basis, to work for the benefit of the company, and that each man should endeavor to have his section in just a little better condition than his neighbors.

A Few Simple Rules Were Adopted

The normal tendency in mine organizations is to increase in complexity as the operation expands. The principle of the section method is to eliminate the complications and get back to simplicity. A large mine is only a combination of small ones feeding into a trunk line haulage road; and each mine (or section) is entirely independent with the policy and government of all administered by the mine foreman on a standard system of rules.

Tipple and Conveyor, Pittsvein Coal Co., Flemington, W. Va.

These rules need not be so numerous and complicated that a book form is necessary. In this particular mine, sixteen rules were selected with eight subdivisions, easily understood and remembered, covering the causes of accidents. They are simple instructions to the section men, and must be enforced.

In Addition to the State Mine Law the Following Rules Must Be Observed

(1) Make a written daily report to the office on the blank forms furnished, showing mine conditions.

(2) Place "Danger" boards at all abandoned places.

(3) A regular system of timbering must be adopted for each condition, suitable cap pieces being furnished with the props.

(4) Permanent brattices must be of incombustible material.

(5) The mine humidity must be 95 per cent.

(6) All electric wires must be securely hung, and free from "grounds," with connections carefully made. They must be boxed at all crossings. A "Danger" board must be placed where men are likely to come in contact with the wires. Coils of "live" wire must be marked with "Danger" and placed to one side.

(7) All haul roads must have a clearance between car and rib of 2½ ft.,—or whitewashed refuge holes every 60 ft.

(8) Dangerous slate on the haulroads must be secured or removed promptly upon discovery.

(9) The brakeman must always be at the rear of the trip before it starts.

(10) Drivers must not ride on the front end or between the loaded cars.

(11) At all times there must not be less than two experienced men on all pillar workings.

(12) Props in the rooms must clear the car by 12 in.

(13) There should not be less than three props and cap pieces ready for use, in all places requiring timbers regularly.

(14) Every working place not marked with a "Danger" sign must be visited twice daily. After an idle day the first visit must be made as promptly as possible in the morning.

(15) "Exit" arrows must be placed throughout the mine showing the way to the nearest opening.

(16) All employees must be instructed in the particular dangers incident to their work, and furnished a copy of the mine law and company rules; and attention called to the following safety rules:

(a) Employees must not work in a place in need of timbers, or known to be dangerous.

(b) Nobody is permitted to ride on loaded cars underground, except those whose duty requires them to do so.

(c) Men riding in an empty car should put their tools in another car.

(d) Remove your lamp from your hat while handling explosives.

(e) Examine your roof FIRST,—and do not enter after firing a shot until the smoke clears so that you can do so.

(f) Use a copper needle and keep an axe.

(g) Do not drill out a shot that fails—bore another hole.

(h) Miners must properly prop and secure their working places, and order the necessary timbers from the foreman or assistants at least one day in advance of their needs. Miners must keep not less than three props and cap pieces on hand ready for use and emergency at all times.

A suitable form is used on which the report of each section is rendered daily, countersigned by the foreman and kept on file in the office. All cases of violation of the rules are noted, recommendations made and material ordered, and the notation continues until relief is given. It is needless to say that, with these reports going to the office, there is rarely a repetition of any complaint.

There was a little difficulty experienced in getting men to take charge of the sections, as the State Department had adopted the policy of holding inquests after all fatal accidents, and the feeling among some of the men was that this system shifted the responsibility to some "under dog." One of the advantages of the system was to take undue responsibility off any one person. If the section men follow their rules, report any violation, make their recommendations and order the necessary material, they have done all they have any authority to do; and the responsibility rests higher up.

The Proper "Spirit" Was Important

In starting the system there was some trepidation on the part of the management as to getting it going in the proper "spirit." Great care was taken in the selection of the men. The spirit, or general tone, of the employees in any industry, is of greater importance than is generally supposed. There is a vast difference in costs when every employee is determined to shirk, and when every employee is endeavoring to help, and the difference increases directly with the number of employees. One section, the smallest, was left under the care of the foreman to serve as a model, but was found unnecessary for this purpose.

There was no standard system of timbering adopted, as the character of the roof varies considerably, and the most satisfactory method depends entirely upon the conditions. Verbal instructions are given in all cases to the

section men frequently after a consultation as to the most advantageous method for any particular case.

The practice in this region is to pay the miner for certain "dead" work which he performs, such as gobbing roof slate or clay-vein rock, pumping or bailing water, shooting up a roll in the pavement or cleaning a fall in his working place. It can easily be seen how this expense may be greatly increased unless care is exercised by the foreman.

Miners have been known to encourage a fall in their working place in order to get the work and allowance for cleaning it up. The amount of water bailing is rarely as arduous a task as the miner pretends, but the foreman finds it a hard matter to take the necessary time to determine just how much work the miner does.

It is in allowances of this kind that the section system has shown a great improvement in costs. Every little thing is under strict and detailed supervision, and even with this supervision the amount of actual work which the section man can get done himself is surprising. The reason of this is that his section is small, he loses no time traveling over thouands of feet of headings, he knows just exactly what needs doing and the tools and material are convenient.

He is commended if he collects a pile of scrap copper in his tool box or a pile of recovered timbers along the heading which under the old system nobody had time to get together. The spirit of waste is replaced by the proper care of all supplies. The actual cost of production was decreased in both labor and material. This decrease was considerable, and with it was the remarkable feeling of security in that the general conditions were improving and not on the decline.

The Main Causes of Accident Were Attacked First

The original object in starting the system was to reduce the accidents by insisting upon a better method of timbering and by a more careful and frequent examination of the roof in the working places. Fifty per cent. of all fatal accidents are caused by falls of roof and coal; explosions, mine cars and motors are the next most prominent. The question of explosions is entirely too extensive to put under the care of the section men, and is eliminated from this general system, being included only in the province of the foreman.

In carrying out the idea of simplicity, and rather than confuse the minds of many of the workmen with too numerous safety rules, the campaign was started on two points only, the roof and mine cars. A few hundred feet inside the pit mouth the workmen cannot fail to see an illuminated sign reading:

EXAMINE YOUR ROOF FIRST
DO NOT ENTER YOUR WORKING PLACE
UNTIL SMOKE CLEARS

He sees this same sign many times before he reaches his working place. It is further impressed upon his mind with the visit of the section man to inspect his roof and detect any weakness. There is a second visit of the section man later in the day.

Ample whitewashed refuge holes are provided along all haul roads, and the following sign is placed frequently:

DO NOT RIDE
ON LOADED CARS

At the junction points of all haulroads used by drivers the following sign is placed:

DRIVERS MUST
STOP
LOOK
LISTEN

The drivers are instructed not to ride on the front end or between the loaded cars, and they are not permitted to do so.

The constant drumming of these simple rules has the effect of starting each individual to thinking of the other dangerous practices in which he indulges, and by so doing a careful miner is finally produced; while a long list of safety rules would only serve to discourage him.

The men are taught in what way to be careful and are constantly reminded of dangerous practices and these are the integral parts of safety first. To pick out all the various causes of acidents and instruct each miner regarding them would be an impossible task and would be of no value unless the man himself had the inherent desire to protect himself.

This can only be brought about in many cases by making his lessons numerous and simple, and then his education along this line will continue voluntarily. The section system teaches the men the simplest and most important rules of care, and where necessary insists and commands that they be obeyed.

In the mine in question, accidents have greatly decreased. The output is more regular. Foreign holidays are not so seriously felt as there is a concentrated effort on the part of every section man in the early morning to get those men who are in the mine to load a large turn. There is less trouble with the miners "out of coal" on account of the failure of the machine to cut the place.

I am enthusiastic in my statement that the mine has been run with less friction, on a safer basis, and at a cheaper cost than under the old system of boss, assistant boss, driver boss and track boss.

Notes on the Coal Situation in Peru

Conservation of the coal properties of the republic was several regions certain lands containing coal were withdrawn from denouncement. The government's desire to develop the fuel production of the country is manifested in its willingness to facilitate the building of railways in the coal-bearing regions. Studies have been made of the districts of Hatunhuasi, Oroya to Huansyo, Sayan to Oyon, and Checras, in which districts large coal deposits exist. The government hopes eventually to interest foreign capital in the opening of these districts. The annual importation of foreign coal is valued at about $1,099,000, most of which comes from England, Germany (briquettes), and Australia—from the latter country in sailing vessels. American exporters of coal should be able to compete favorably with these countries after the opening of the Panama Canal.—*Daily Consular and Trade Reports.*

When scaling indicator diagrams, the pressure to be taken is that immediately at the end of the compression period, not at the end of the delivery, for it is invariably found that the pressure of the air falls off after the valves have opened.

Commutating-Pole Motors for Mine Locomotives

By R. E. Hellmund and W. A. Clark*

SYNOPSIS—A reply to a former paper printed in Coal Age, *this article vigorously advocates the installation of the commutating pole on mine locomotive motors.*

In the issue of Coal Age for May 9, 1914, A. R. Anderson attempts to show that the adoption of commutating-pole motors for mine locomotives is ill advised. Since our experience along this line stands in marked contrast with the conclusions arrived at by Mr. Anderson, it may be of interest to the readers of his paper to have the matter presented in a somewhat different light.

Under the heading, "Interpoles are not new," Mr. Anderson mentions the first record of the idea of commutating poles which he has been able to find, also some experiments made by Mr. Sprague along this line in 1885. Undoubtedly, the historical facts as given are correct, but

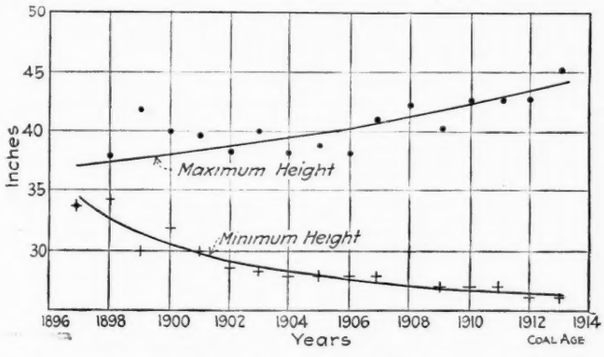


Fig. 1. Maximum and Minimum Height of Mining Locomotives

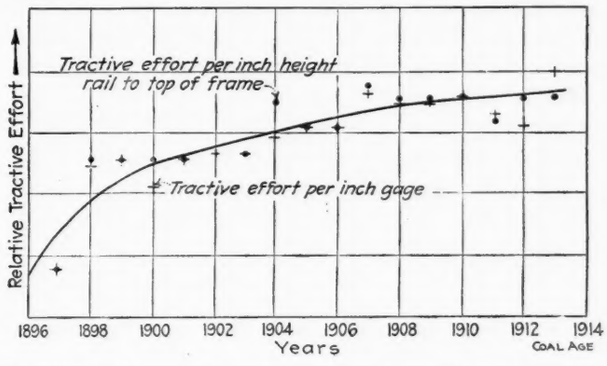


Fig. 2. Tractive Effort per Inch of Height and of Track Gage

they do not by any means furnish a complete history of the development of the commutating pole. Ever since the fundamental idea was first conceived it has been a number of times reinvented and numerous experiments have been conducted during the last 20 years by engineers in this country, as well as abroad, for the purpose of improving the commutation by means of interpoles or otherwise.

One of the writers took part in extensive investigations which were conducted by a German concern about 1899 for the purpose of finding means for improving the commutation of direct-current machines. The technical literature, as well as the patent records, of the various countries have numerous records of suggestions and attempts made to improve commutation.

We mention all of this merely because it is an almost indisputable proof that there existed a need for improvement on the old motor without commutating poles, or the many engineers of all countries would not have wasted their time in trying to find something better. The only reason why commutating poles were not adopted earlier than a few years ago, is because the laws of commutation were not well enough understood to enable the engineers to apply such devices economically. Ever since fairly reliable theories of interpole design have been worked out and published, the adoption of this contrivance has been almost universal.

We fully agree with Mr. Anderson that with liberal dimensions, fairly good commutation may be obtained with many machines which do not have to be reversed, and on which it is, therefore, possible to shift the brushes somewhat out of the neutral zone. In case of railway and mine locomotive motors, however, where the brushes have to be located in the neutral region because it is impracticable to shift them every time the motor is reversed, it is possible to obtain fair commutation, even with liberal dimensions, only under extremely favorable conditions.

For this and other reasons, to be mentioned later, it has become an indisputable historical fact that with the noncommutating-pole motors used for traction work, the consumption of carbons is from 3 to 10 times as large as with modern commutating-pole machines.

It is further a fact that with noncommutating-pole traction motors the commutator in many cases has to be renewed once or twice during the life of the machine on account of its having worn down. On the other hand, a replacement of the commutator for the same reason is practically unknown with the modern commutating-pole motor, although the life of these modern machines is considerably greater due to other improvements in motor design.

The Application of Interpoles

Under the heading, "With limited dimensions, use interpoles," Mr. Anderson states: "Another legitimate application of interpoles is found in motors where the dimensions for a given horsepower and speed are limited by the machine of which the motor is a part." Further on, he says, "In general, interpoles are desirable and properly applied in cases where the motor is subjected to overloads or where a large horsepower at a low speed is cramped into small dimensions."

We most heartily endorse these two statements because they give the most important reasons why we are advocating the use of commutating poles in motors for mine locomotives. To make ourselves perfectly clear, we will re-

*Westinghouse Electric & Mfg. Co., East Pittsburgh, Penn.

peat that we are advocating the use of commutating-pole motors in mine locomotives because satisfactory commutation cannot be obtained in such motors without them on account of the following facts:

1. The brushes must be located in the neutral zone and cannot be shifted to improve commutation on account of the practical operating conditions.

2. In mine locomotives the motor-space limitations are extreme, as will be discussed somewhat more in detail later.

3. The motor for mine locomotives is frequently subjected to overloads, as will be pointed out more in detail shortly.

Mr. Anderson discusses how it is possible to obtain cheaper machines by the use of commutating poles for certain sizes of motors, but he states that with the sizes usually employed in mine locomotives, the use of commutating poles will not give a cheaper design. We again fully agree with this statement and would add that in small motors such as are used for mine locomotives, it is a common occurrence that the use of commutating poles increases the cost of manufacture.

It should, therefore, be evident that the manufacturer furnishing commutating-pole motors in spite of their higher cost can have only one object in view, namely, to put out an improved product and to give his customers better service and satisfaction.

To the further statement that the commutation is but little improved under working conditions, we wish to take exception and refer back to the facts we previously gave regarding the decreased brush and commutator wear made possible by the use of interpoles. The statement that commutating poles may cause additional expense and trouble for the operator, we will discuss later.

The Coefficient of Adhesion

Under the heading, "A locomotive can only exert a certain pull," Mr. Anderson attempts to show that a properly designed mine locomotive cannot be overloaded. He states that the maximum load depends upon the coefficient of adhesion between the locomotive wheels and the rail, which latter statement is quite correct. He is wrong, however, in connecting a coefficient of adhesion of 20% to 25% with this discussion of maximum possible load, since it is a fact well known to every engineer connected with traction work that a coefficient of adhesion of 33% is not at all uncommon, and with sanded rails, the coefficient of 40% or possibly somewhat higher, may be obtained. Moreover, where the brakes are used to prevent slipping of the wheels, the motor load may correspond to a considerably higher adhesion. The only way to prevent the motor from overloads would, therefore, be to design it with a rated capacity corresponding to a coefficient of adhesion of at least 40 per cent.

Further on, Mr. Anderson states: "Since there is nothing to prevent the motor from being operated continuously at this maximum horsepower (he refers here to the horsepower dependent on the maximum coefficient of adhesion) while the motor is in operation, the motor equipment should be at least large enough to meet this condition." The incorrectness of this statement is self-evident because it is a commonly known fact that in practical operation train resistance for numerous reasons varies over wide limits.

The resistance of a given train is certainly greater going up hill than it is going down hill; it is larger on a curve than on a straight track; it takes more tractive effort to accelerate a train than it does to keep it in motion; all this is beyond doubt.

How is it possible then with such unavoidable variations that the motors continuously exert the maximum possible tractive effort? Another reason why the maximum possible motor load cannot be maintained continuously, or even for an hour, is because the coefficient of adhesion depends so thoroughly upon the varying conditions of the rails, that it is practically impossible to maintain its average anywhere near equal to the possible maximum.

The practice of rating the motors continuously, or even on a one hour basis equal to the possible maximum, of say, 40 per cent. adhesion just in order to make overloads impossible, would be wasteful not only in first cost, but also because a motor of such size would have a low efficiency and consequently high power consumption at the average load under actual operating conditions.

But Mr. Anderson proposes to go even farther and states: "The correct motor equipment for industrial haulage and especially mine haulage, must have a normal capacity, at least equal to, and preferably 10 per cent. to 15 per cent. greater than the maximum tractive effort which a locomotive can develop, etc." In other words, Mr. Anderson proposes to use motors with a normal rating 10 per cent. to 15 per cent. bigger than can be utilized at any time, and about 100 per cent. larger than is needed. A close study of the locomotives offered to the trade reveals the fact that none of them have a horsepower rating equivalent to a coefficient of adhesion of 44 per cent. to 46 per cent.

Customary Ratings of Motors

The same study will also show that it is common, uptodate practice to employ motors having a one-hour rating corresponding to a coefficient of adhesion of from 15 per cent. to 25 per cent. and a continuous rating, corresponding to less than half these values. This means that all locomotives at present available to the trade may be overloaded whenever the coefficient of adhesion is as high as 30 per cent. or 40 per cent., and it will be remembered that Mr. Anderson himself says "Interpoles are desirable and properly applied in cases where the motor is subject to overloads, etc."

Under the heading, "Sufficient space is usually available," the statement is made that sufficient space is available in practically all types of locomotives to permit of the design of good moncommutating-pole motors. While the conception of a good commutating motor is flexible and largely a question of opinion, it cannot be denied that the brush and commutator wear on practically all noncommutating-pole machines is from 3 to 10 times as large as with modern commutating-pole motors. And while the operator of mine locomotives may not be much interested in just how good the commutation of his motors may be, he is vitally interested when it comes to bearing the expense and suffering the delay caused by replacing carbons and commutators, or dealing with such other troubles as are liable to occur with noninterpole machines. These will be discussed later on.

But, even if it were a fact that fairly good commutation could be obtained in a frame of given dimensions, this would surely not be a sufficient reason for not build-

ing something better. It is undeniable that commutating-pole motors commutate better than non-commutating-pole motors. Fully 90 per cent. of all direct-current machines of 10 hp. and above are now being built with these poles for the purpose of improving the commutation.

With regard to the space limitations imposed upon the designer of mine locomotives by the existing conditions, we wish to state that in 16 years of experience in designing motors for all kinds of applications, we have not found a case where the space limitations were as exacting and extreme as in mine locomotives, where the motor is limited in width, breadth and height, as well.

The narrow gages used for mine locomotives limit the axial length of the motor to a few inches. The desirability of obtaining the maximum tractive effort from a given machine by using the smallest possible pinion, limits the gear-center distance and therefore the horizontal width of the motor while restricted head room limits the height of the motor.

which may spark under certain conditions, to a commutating-pole motor, which ordinarily will not spark.

Mr. Anderson states that the installing of commutating-pole motors is equivalent to installing so much additional and unnecessary apparatus, from which there is liability to breakdown and for which repairs must be carried in stock, etc. He further gives a view of the wiring of a noncommutating-pole motor and a complicated diagram of a commutating-pole motor.

Only Two Interpoles Are Needed

Instead of adding four poles, as shown in this drawing, it is quite sufficient except in large motors, to install two commutating poles and coils. The poles proper are pieces of flat rolled steel, bolted to the frame, and require no attention or repair. From Fig. 4, this is self-evident. The two commutating-pole coils—one of which is shown in this figure—are in structure similar to those for the main poles. It is well known that the trouble caused by modern field coils is practically *nil*, as com-

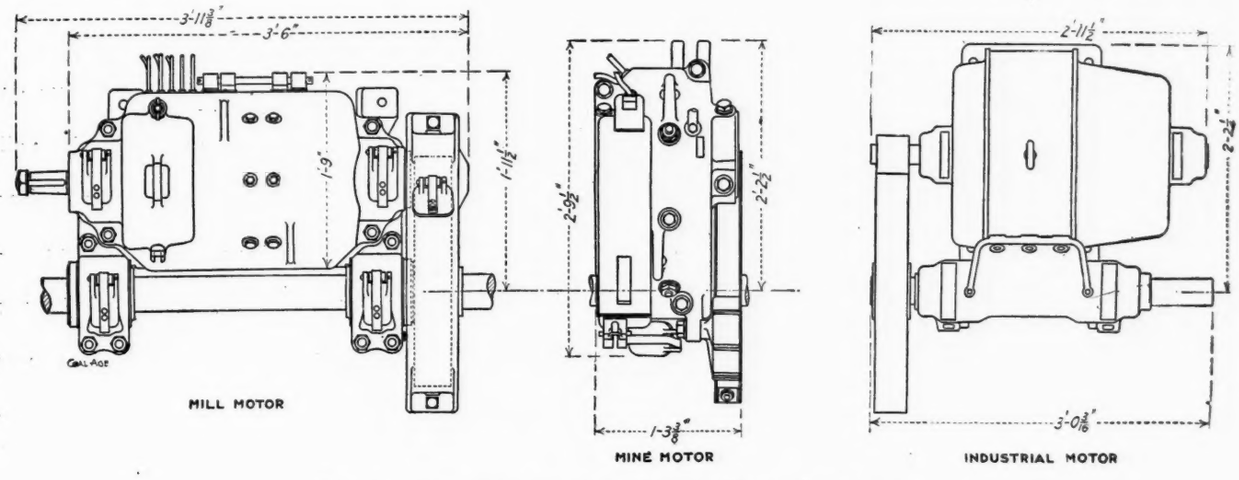


Fig. 3. Relative Sizes of Various Types of Motors

We give herewith two curves taken from a paper by G. M. Eaton, which demonstrates the fact that these conditions are becoming more and more exacting every day. One curve shows the minimum height allowed for mining locomotives over a period extending from 1896 to 1914. It will be seen that there has been a continuous decrease in minimum head room. The other curve shows the relative tractive efforts obtained per inch of height of locomotive as well as that per inch of gage. It will be seen from these curves that there exists a continuous demand for increasing the motor rating, crowded into a certain space.

Fig. 3 shows a mine-locomotive motor, a mill motor and an industrial motor all drawn to scale. These are all commutating-pole machines and have approximately the same nominal rating. This illustrates clearly how it has been necessary to condense machines for mine-locomotive service.

Under the heading, "Commutation Is Not Always to Blame," Mr. Anderson intimates that sparking and its destructive effect are not always due to motor design. While it is quite true that excessive vibrations and commutators out of round may cause sparking, we do not see why one should prefer a noncommutating-pole motor pared with that experienced with brushes, commutators and armatures of motors without commutating poles.

The installation of commutating poles means, therefore, the addition of a few extremely simple parts, which are not subject to wear and which practically never give trouble, for the purpose of eliminating marked wear, much trouble and the necessity for repair.

Fig. 5 shows a commutating-pole motor with all necessary wiring, as it is actually installed by the Westinghouse Electric & Mfg. Co. This is in marked contrast to the sketch given by Mr. Anderson, in an apparent attempt to make the connections look as complicated as possible.

A few other points may be of interest in connection with the question of commutating-pole, versus, noncommutating-pole motors.

The absence of interpoles and the consequent poor commutation often leads to other troubles. Bad commutation means, in most cases, a quick roughening of the commutator. A failure on the part of the operator to smooth this by sandpapering, or even turning, will result in vibration of the carbons. Thus, a replacement or repair of brush-holders is often made necessary by the absence of commutating poles.

Bad commutation and the consequent wearing and breaking of carbons also, frequent sandpapering of the commutator, all lead to the accumulation of carbon and copper dust inside of the motor. This forms a good conductor and is often the cause of insulation breakdowns and consequent burnouts of the various parts of the motor, meaning again, additional expense for repairs and operating delay caused by the absence of commutating poles.

Again, bad commutation means that the commutator, instead of assuming a polish, will blacken and cover all over with a film of carbon and copper. This leads to the breaking down of the insulation between the commutator segments, and an arc flashing over between the brush-holders. This arc, when once established, will sometimes

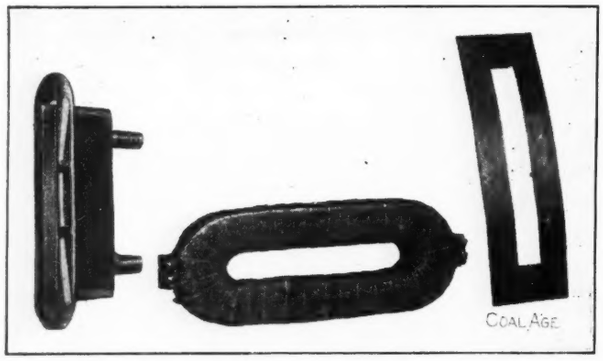


FIG. 4. THE THREE PARTS OF THE COMPLETE COMMUTATING POLE

burn holes into the commutator copper; sometimes, it will burn the insulation of the commutator V-ring, while at others, it will even burn the insulation of the armature and field coils in the neighborhood of the commutator, necessitating the replacement or rewinding of these parts with attendant operating delays.

The operation of the commutating-pole motor stands in marked contrast to all this. An interesting case, which has come to the writer's attention, and which is typical of the limited inspection with which a commutating-pole

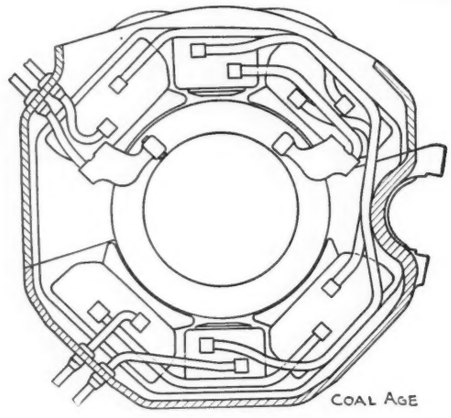


FIG. 5. CONNECTIONS FOR MOTOR WITH TWO INTERPOLES

motor may be operated, is the first locomotive furnished by the Westinghouse Electric & Mfg. Co., supplied with commutating-pole motors. In this case, it had not been necessary to open the motor during 18 months of service, nor even to remove the commutator cover to inspect the motor. After two years' and ten months' service, it had not been necessary to make any repairs or to even replace carbons.

Similar results have been obtained with most commutating-pole motors.

Special reference might here be made to the fact that commutating-pole motors have given so good results in connection with trolley-car and heavier traction work, that it is practically impossible nowadays to sell anything but this type of machine in this line.

In conclusion, therefore, it may be stated that those manufacturers who have spent large sums of money for developing commutating-pole motors to supersede their old lines of noncommutating-pole machines, have done so after carefully considering the merits of the case. And they have succeeded in giving to the trade a vastly improved product.

Don'ts for Superintendents

Don't fail to have safety gates at the top and at each lift of every shaft and heavy pitch slope wherein men are lowered and hoisted.

Don't fail to provide safety overwinding devices on all shafts where men are lowered and hoisted.

Don't fail to provide safety switches or blocks above all breakers to safeguard loaders.

Don't fail to have doors and stoppings constructed as required by the mine law.

Don't fail to provide every mine with a sufficient number of danger signals or signs.

Don't fail to see that all rules are observed for the handling of explosives.

Don't allow any person in a state of intoxication to go into any mine.

Don't fail to observe the mine law pertaining to ventilation so as to maintain healthful and safe conditions.

Don't fail to observe the law relating to sinking new shafts.

Don't fail to use every precaution to insure the safety of the workmen in all cases.

Don't fail to provide an efficient alarm or light to be attached to the front end of every trip pushed by a motor inside the mine.

Note—Taken from Susquehanna Coal Co.'s book of instructions.

"Too Busy To Read"

He is a familiar type—the fussy, fretful man who imagines that he is about the busiest fellow in town. He often dumps in the waste-basket unwrapped copies of business or technical magazines that contain valuable articles bearing directly on his problems. He fondly believes that he is too busy practicing to bother with what others are preaching.

The trouble with this type of man is that he has not learned that the real executive is the man who so plans his work as to leave a reasonable amount of time for reading and planning.

There are shoals and breakers ahead when the accumulation of new ideas ceases. The man who declares he has no time to read is unconsciously advertising his small caliber, his slavery to detail, his arrested development.—*Printer's Ink.*

Who's Who in Coal Mining

Robert Marshall Irving

There is one race to which the coal industry is greatly indebted for many of its men, its ideas and traditions. Just as a duck takes to water as its natural element, the Scotchman takes to coal mining as his life's work. And, as a general rule, they don't remain at the digging game very long, for their proficiency usually brings advancement to positions of trust and authority.

Over in Ayrshire, Scotland, about the year 1870, Robert Marshall Irving had a son, who was named Robert Marshall, Jr. When the boy was 10 years of age, he began working in the mines in Ayrshire, and continued

R. M. Irving

at this employment until he was a young man of 20 with hard muscles and plenty of experience in digging coal from the bowels of old mother earth. Scotland isn't a very large country and Robert discovered that there were more people there to the square mile and fewer opportunities than there were in the newer world across the ocean. So, in 1890, he emigrated to America, landing in Blosburg, Ala.

Just as soon as he could get his overalls on, he started work in a mine in Jefferson County, later changing to another mine in Walker County, Ala. After two years of such employment he started north, landing in the Block coal field at Knightsville, Ind., in 1892.

After five more years of hard, earnest work in the Indiana mines, he secured a job as pitboss; this gave him a hold on the ladder that leads upward, and neither elements nor men have been able to shake him loose.

It wasn't very long after this when Mr. Irving was advanced to the position of mine superintendent, which job he held for nine years, resigning the place to accept employment as a district mine inspector in Indiana. The duties of this latter position occupied his attention for five more years, when his experience and ability were recognized through his advancement to the general superintendency of the Monon Coal Co., with headquarters at Terre Haute, Ind. He has served four years with his present company.

At the inauguration of the Mine Inspectors' Institute of America, held at Indianapolis, Ind., Mr. Irving was elected third vice-president of that organization. Like most men who have aspired to be something more than a miner, and yet who have not had the advantages of an early education, he has been compelled to gather his theoretical training at odd moments when the opportunity was afforded him. It is this kind of training that sticks best, for it is always gained through much personal sacrifice. Mr. Irving's night study enabled him to complete an entire correspondence course in mining, which training, added to his years of experience in all positions from miner to super, has rounded him into a coal official, whose opinions carry weight in the field of his employment.

War Makes Many U. S. Citizens

There has been a marked increase in the number of applications for first citizenship papers at the prothonotaries' offices in the anthracite region of Pennsylvania since the outbreak of the European war. None of the companies report the loss of many men by the return of foreign reservists, and some say that they never before had so many men on their payrolls.

There is probably no other labor center in the country where the population is so diverse as at the anthracite mines. One company states that its average payroll last year was 12,782 men. Of the men employed in the course of the year, 6284 were Russians, 5284 Americans or naturalized citizens, 2141 Poles, 1165 Tyroleans, 805 Austrians, 751 Lithuanians, 599 Italians, 522 Slavs, 247 Hungarians and 100 Greeks.

Men of all nationalities are registering with their consuls for a possible return later, but many of them are over military age, many have already been naturalized and as there is a normal increase in population in the anthracite regions, many of the bread winners would be loath to desert their families.

On the other hand, many of the English employees of the mines are going home on account of their better facilities for getting there, and there are a number of miners among them. It takes three years to get a miner's certificate, according to the state laws of Pennsylvania, so these men are more difficult to replace than miners' laborers.

While there is a fair amount of hard coal in storage at present, most of it is of the steam sizes, and there is little domestic coal on hand, so those who are filling their bins now may not be altogether unwise.

In order to reduce the skin effect in conductors carrying heavy alternating currents of high frequency, it is customary to use a specially constructed cable having a hemp center. This type of cable is also required in many long distance transmission lines in order to increase the diameter sufficiently to prevent corona effects due to extreme potentials.

Editorials

Foreign Inquiry for a Large Tonnage

As evidence of the increasing activity in the export business, an inquiry has been received at this office for quotations on a tonnage of not less than 10,000 per month over a period of from one to three years. Quite favorable terms are offered, thus removing one of the most objectionable features the American operators have so far reported in this new business. On the other hand, it is noted that analyses must accompany all bids, which would indicate that the question of quality will be a ruling factor in the situation. Indeed, it is already generally accepted in all quarters that it will require the highest-grade coals we produce to meet the exacting requirements of this prospective foreign trade.

We would be pleased to have any coal company interested in securing a share of the prospective foreign business, communicate with us, in order that we may turn over to them any inquiries or information we receive relative to foreign opportunities. A representative of COAL AGE is now on the way to South America.

The Economic Resources of the United States

The present European hostilities have furnished a good opportunity for investigations, both public and private, for the purpose of ascertaining our own national resources. These inquiries have been conducted with a view to extending American foreign commerce, learning how far, or how nearly, we may supply at home many of the commodities heretofore imported from the Old World, and also with a view to discovering just how nearly we are or might become a self-sustaining country in time of national peril or calamity.

The Bureau of Foreign and Domestic Commerce is in daily receipt of many letters from American manufacturers and producers making inquiry regarding possible markets abroad for their surplus products, also as to the ability of the United States to supply the raw materials necessary to their industries. The investigations necessay to the intelligent reply to these letters have revealed the fact that in many instances materials imported from abroad are of a kind and nature already found in this country, the production of which is, however, at the present time in its infancy. This is particularly true of many chemical industries, the basic materials for which are now being partially utilized, whereas a few years ago, they were utterly wasted.

The position of the United States is peculiarly fortunate in its ability to supply the three primary requirements of man, in the shape of food, shelter and clothing. This is clearly demonstrated by an inspection of the figures showing the country's production of these commodities relative to that of the world.

There is no question but that the people of this cohntry may be fed from food-stuffs of home production. The United States has an area of somewhat over 3½ million sq. miles under climatic conditions which are highly varied. This area is equal or nearly equal in extent to the whole of Europe, which supports a population five times as great as that of this country.

Agricultural development in Amrica has not progressed to the degree of perfection attained by the people across the sea, and we may, therefore, legitimately expect that our production will increase greatly in the future.

Even in our present status, this country produces over 2½ billion bushels of indian corn, which is approximately two-thirds of the world's supply. For the current year the wheat crop is estimated at 911,000,000 bushels, or about one-fifth of the world's yield. This country annually produces approximately 1,000,000,000 bushels of oats, or 25 per cent. of the world's crop, also something like 197,000,000 gal. of cottonseed oil, the food value of which as a substitute for olive oil is gradually becoming more recognized.

America possesses 15 per cent. of the world's cattle, or 59,000,000 head; this is twice the number raised in Argentina, and one-half as many as are maintained in India. We also have 50,000,000 sheep, 60,000,000 hogs and 24,000,000 horses. On the other hand, we import 2,500,000 tons of sugar, or approximately 1½ times the amount produced in continental United States and its island possessions.

So far as textiles are concerned, the United States produces over 14,000,000 bales of cotton annually, or one-half the world's supply, a little less than 300,000,000 lb. of wool per year, this being supplemented by approximately 238 million lb. of foreign wool and importations of woolen goods to the value of $34,000,000.

As regards mineral production, the position of the United States is unquestionably preëminent. We produce 40 per cent. of the world's coal, 238,000,000 barrels of petroleum, or ⅔ of the world's output, 57,000,000 tons of iron ore, out of the world's production of 132,000,000 tons; and, during 1912, nearly one-half of the world's copper came from American mines. The world's annual production of gold is valued at $466,000,000, and of this total output in 1912, the United States furnished approximately 20 per cent., being exceeded only by South Africa. Twenty-eight per cent. or thereabouts of the world's silver, and 30 per cent. of its lead are produced in this country.

In the value of its manufactures, the United States excels the world, but the product of its mills is almost entirely consumed at home. Of manufactures to the value of $21,000,000,000 produced in the United States in 1909, only about 5 per cent. found its way to other countries, the foreign markets for iron and steel, cotton goods, chemicals and many other industrial products, being held by various European nations.

The above figures indicate clearly the strong position which this country holds in regard to those factors of

national wealth which render a people self-sustaining. They may, to a certain extent, be summarized as follows: With 7 per cent. of the world's land area, we have 6 per cent. of its population; we produce 68 per cent. of the world's supply of corn, 20 per cent. of its wheat, 50 per cent. of its cotton, 10 per cent. of its sugar, 35 per cent. of its tobacco, 15 per cent. of its cattle, 40 per cent. of its coal, 63 per cent. of its petroleum products, 55 per cent. of its copper, 44 per cent. of its iron ore, 20 per cent. of its gold; and we have farm products annually to the value of $9,751,000,000, while our various industries annually produce commodities to the value of $20,672,000,000. Our imports for the fiscal year 1914 were $1,849,000,000, while our exports during the same period were $2,365,000,000. These are 9 and 12 per cent., respectively, of the world's total. We have approximately 259,000 miles of railroad, or 38 per cent. of the railway mileage of the globe, and our aggregate weath is figured at $140,000,000,000.

While actual figures of production in themselves mean little or nothing, it is when seen in percentages of the world's total that they become truly significant. We may justifiably believe from the above, that this country could, should the necessity therefor arise, produce all of the necessities of life required by its people, and not a few of the luxuries as well.

Electricity, an Economical Factor in Mining

The aim of every mine manager is to reduce costs. The ever-increasing burdens being placed on the coal industry by legislative action, and through the demands of labor, render it necessary for mining companies to adopt measures of economy wherever such action is possible.

There is more and more evidence coming to hand that shows the considerable saving resulting from the adoption of electricity for power purposes. On p. 454, this issue, attention is called to the economies effected by a Western company through substituting electricity for steam.

We have before us data from still another mine where the same plan was carried out. In this latter case the mining company installed a plant, the total cost of which was $106,000. By the adoption of the scheme, the colliery fuel consumption has been reduced more than 2 per cent. Twenty-five horses have been dispensed with underground, and there has been a great reduction in labor, due to the substitution of mechanical for animal haulage.

Plenty of current is available underground for further extensions in the way of haulage, coal cutting, lighting, etc. And referring to the matter of lighting stations underground, if electricity is not actually more economical, there is no doubt but that it is far more convenient and much safer.

The management of the plant in question represents to us that the saving resulting from the adoption of electricity amounts to 18½ per cent. when expressed as interest on the capital outlay.

In speaking of the initial cost of such installations, we have in mind a plant which was put in at a small mine where the company did not feel able to invest in a complete or elaborate equipment. The entire installation was effected by the colliery staff. Old iron and steel winding and haulage ropes were used instead of copper cables. The surplus power of three-ventilating fan engines, and the sawmill engine was employed, so that only the dynamos, lamps and small lengths of branch cables were required to be purchased. This installation is referred to, not for any real value it possessed, but simply to show how the engineer may adapt himself and successfully apply whatever simple means he may have at hand.

Given the necessary initiative, the mining experience of the purely practical order may have its compensations in that it often compels the engineer to look at science in the light of its real application, and to understand more thoroughly the limits to which one may go when conditions or circumstances are quite unfavorable.

Rescue Work

The important work of rescue after a serious mine accident, should be standardized as much as possible. Conditions, of course, differ, so that hard-and-fast rules cannot be laid down; however, there should be the broadest possible exchange of ideas and experiences, so as to perfect as far as possible an effective service.

Many mistakes have been made in recovering mines after accidents. Lives have been sacrificed unnecessarily. Some points gathered from recent experience may well be repeated and emphasized!

Every corps going underground, for the purpose of rescuing entombed miners, should carry, aside from the ordinary outfit, additional apparatus to be used as a "salvator." When men are found overcome by gas, a salvator should be fixed on each one, and he should be brought back to the rescue base. If a team comes across two men, one injured and the other uninjured, the latter should be brought out first, and on the second trip, the men should take in a stretcher and upon it convey the injured man to a place of safety.

The European practice of establishing a base where doctors, inspectors, colliery officials, ambulance men with stretchers, and all others following the team and who are not provided with apparatus must stop, is a good plan. At such a base the team leaves a canary and all their spare gear. Those without apparatus on coming up must not advance beyond this point.

If, on returning to the base, the rescue team finds the bird alive, they can take out their mouth piece to speak, but if the canary is dead, everyone will know that the gas has backed up, and all will proceed to the shaft bottom or the surface, where they can secure another bird.

These suggestions may not seem so consequential to many, but it is the neglect of small details that has so often caused disaster. We would be glad to have any of our readers add further precautionary measures, suggested by their own experience.

Oil from Coal

The nations of the world are turning more and more to the use of oil for burning under boilers on the smaller battleships. Coal operators need not be alarmed at this tendency to replace coal, for the supply of oil suitable for power purposes in the world today is hardly adequate to satisfy the present urgent demand. It is probable, therefore, that the application of a little sense and science to the subect on the part of the coal industry will bring about the manufacture of all the oil needed from those coal seams which readily yield such a product.

Extracts from a Superintendent's Diary

Occasionally seven-passenger touring cars and sometimes larger ones loaded to capacity with pleasure seekers pass through our camp. We are not exactly on a main highway, but we are near enough to one to be considered accessible by any whose curiosity suggests a visit to a miner's village.

Honk, honk, we hear them coming long before they arrive, and at the first intimation of their approach, the small children (we are always well supplied with children) grab up their marbles from the streets and make for the sidewalks. They have long since learned that automobilists have little sympathy for kids who play on streets. As they pass by the staring children they inquire the way to my office and immediately on arrival one of the party comes blustering in and condescends to introduce himself, and then without further preliminaries, suggests that the party which he has the honor to represent would like to make a trip underground.

Of course, these requests generally have to be denied, but I always take special pains to explain fully that we are compelled to have very strict rules governing such matters, and then I suggest that with sufficient advance notice it is possible sometimes to arrange such trips, notwithstanding the fact that the company management views them with increasing disfavor because of the risks which must be assumed by all parties concerned under the most favorable conditions.

Disappointed in the main adventure, they do not tarry long, but as they retrace their way through the camp, they feel called upon to converse with some of the children and even some of the grownups, if any chance across their path.

Afterward, by comparing notes, the ones interviewed are able to decide just what the outside world thinks of us.

The picture is always the same, it is the picture of the yellow journals; miners toiling in darkness from sunrise until sunset, earning tremendous wages which they never receive because of the coal barons, who despoil them just as they despoil the starving, freezing dwellers of the city tenements.

I find that similar opinions are held by the vast majority of people, who have no personal knowledge of the mining industry.

My oldest boy, who is away at college, is always in hot water because he lets his temper get the best of him whenever any of his associates inadvertently comment on some reporter's story about a mine strike, or a mine explosion, which reflects discredit upon the mine management.

I have just returned from a vacation trip, and, while traveling about, heard coal-mining men discussed a good deal in Pullman smoking compartments, because as it happened, a group of them were trying to get control of a large tract of coal land in the state through which we were passing.

Sometimes I put in a good word for the "barons," but at other times when every other member of the party expressed such hostile views and came out with them so impulsively, I quite lost my nerve and took out my resentment in biting fiercely on my cigar.

If it were not for the frequent strikes that disrupt and terrorize the industry, it would make little difference to the average mining man as to just what the world at large thought of him, but it is becoming more and more evident that during such times public opinion has much to do with the final outcome and we are incredibly handicapped by the public's willingness to judge us by previously formed opinions which are so unjust to us, but which so closely agree with the statements issued by the strike leaders at every opportunity.

Recent Legal Decisions

Reservation of Coal in Deed—When land is conveyed under a deed which reserves to the seller all coal underlying the land, excepting that reserved by him in a previous deed to a third person, and it appears that in fact there was no reservation of coal under such earlier deed, the purchaser takes no interest in the coal, for lack of any definite description of the quantity intended to be conveyed.—(West Virginia Supreme Court of Appeals, Cummings vs. Hamrick, 82 South eastern Reporter, 44.)

Liability Under Montana Coal-Mining Code—A completed tunnel in a coal mine, used by a miner as a passageway, is not a "working place" within the meaning of the requirements of the Montana Coal-Mining Code that miners must inspect and keep safe their working places; the duty to inspect such a tunnel devolving upon the company's foreman. A miner did not assume the risk of being injured through fall of overhanging loose rock in a tunnel, by reason of the fact that he made a visual examination of the place and found it to be apparently safe. A coal company and its superintendent and assistant foreman are jointly liable for their negligent failure to make proper inspection and repairs to secure the reasonable safety of employees, if injury results to one of the employees as a direct consequence of such failure. (Montana Supreme Court, McInnes vs. Republic Coal Co., 140 Pacific Reporter 235.)

Liability for Injury to Miner—A mining company cannot be held responsible for injury to a miner, caused by a blast in an adjacent entry breaking through the intervening wall or rib, on the theory that the company failed to furnish a reasonably safe place for work, if the condition existed by reason of the fact that the miner or his coemployee in the adjacent entry, or both of them, drove their headings unduly wide. "This did not constitute an unsafe place within the common-law doctrine of the master's duty in respect to furnishing his servant a safe place in which to do his appointed work, for the reason that the work in which intestate and his coemployee were engaged created the place itself and the defective condition of which plaintiff complained." Nor can recovery against the employer be sustained on the theory of negligence in failing to discover the unsafe condition, if the condition was created by the blast which caused the injury. (Alabama Supreme Court, Sloss-Sheffield Steel & Iron Co. vs. White, 65 Southern Reporter 999.)

Effect of Mining Contract—Defendant lent money to plaintiff to develop a coal mine, and agreed to purchase the entire output under a contract which contained this clause: "The prices named in this contract are based on the present Michigan mining rates of $1.01 per ton, and shall be increased or reduced on all sizes of coal as said mining rate may advance or decline, during the life of this contract." At the date of the contract an agreement between the coal operators and the Miners' Union fixed the prices paid by the operators for various kinds of work, but later a new agreement was made. The former agreement fixed the pick mining scale "for 30 in. of coal and upwards" at $1.01 per ton, and the later agreement increased this item to $1.06. Defendant construed this as increasing the price five cents per ton on all sizes of coal and made payment accordingly. Plaintiff claimed that the new agreement with the miners involved an increase of 5.26 per cent. in the cost of producing all coal, and brought suit to recover the amount remaining due from defendant on that basis. Held that the contract between plaintiff and defendant must be construed as fixing the rate for mining 30 in. coal as the basis for any increase or decrease in the contract price of the coal, irrespective of other items connected with the cost of mining. Hence, plaintiff is not entitled to recover. (Michigan Supreme Court, Caledonia Coal Co. vs. Consolidated Coal Co., 148 Northwestern Reporter 187.)

Sociological Department

First Aid Meet at Valley View Park

Keen but friendly rivalry marked the efforts of 16 first-aid teams to capture the Captain William J. May cup in the 9th annual field-day contest of the Pennsylvania Coal Co. and the Hillside Coal & Iron Co., held at Valley View Park, near Wilkes-Barre, on Saturday, Sept. 12.

Captain May is regarded as the father of first-aid contests in the anthracite field. Nine years ago he conceived the idea of bringing the various first-aid corps of the collieries under his jurisdiction together in friendly contests, and in order to incite interest and increase proficiency among the various teams, he donated a loving cup. To retain permanent possession of this trophy it is necessary for one team to be credited with three victories.

EWEN BREAKER TEAM, WINNER OF CAPTAIN MAY CUP

Left to right: Harry Skinner, Tony Polis, Joseph Vanderberg, Wm. Scott, Wm. C. Davies, captain.

MEN WHO TOOK PART IN INDIVIDUAL CONTEST

Left to right: John O'Malley, Del Burdick, Thos. E. Ross, winner, Alex Graham, Moses Ballentine, Wm. Garigan.

The 16 teams which gathered this year at Valley View Park came from the various divisions of the company, Mayfield, Dunmore, Avoca, Forest City, North and South Pittston being represented. Three problems were given each team to work out and the team scoring the highest general average was declared the winner.

The Ewen breaker team, known as the Ewen outside team, won the cup this year with an average of 98, having made a perfect score in two of the problems. The Old Forge breaker team of the Avoca district was second with a general average of 96 and the Mayfield colliery team was third with an average of 93⅓.

Aside from the general events there was an individual contest in which six men participated, these being selected from the different districts. Handsome prizes were offered for their solution of a single problem. A gold watch was offered the winner, a gold chain went to the second best, a pair of cuff links to the third, a scarf pin to the fourth, a safety razor to the fifth and an umbrella to the sixth.

Besides working out the single problem, each contestant in this event was taken before the judges and for a period of five minutes was quizzed along various lines of first-aid work. The success of the contestant depended as much on this mental examination as it did on the field work, and after much delay, Thomas Ross, representing the North Pittston district, was declared the winner, with an average of 95. John O'Malley, of Mayfield, was second, and Moses Ballentine, of Avoca, third.

The judges were highly complimentary of the work displayed in the individual contests and also spoke in flattering terms of the efforts of the various teams, one of the judges remarking that he had seen some exhibitions during the day which would challenge the very best efforts of a highly proficient doctor or surgeon.

Event No. 1 was for three men only. Problem: "Show two methods of performing artificial respiration, one with arms broken or burned. Show how to use control of arterial bleeding from all parts of body by the use of the triangle and roller bandages. Use of roller bandage optional." Time limit, 10 minutes.

Even No. 2 was for four men. Problem: "Wound extending from front of right ear to middle of top of head on a line with the ears; fracture of left lower jaw; wound of left groin, and upper front part of thigh. Bad sprain and constusion of right ankle with extensive swelling." Time limit 10 minutes.

The third event was for full teams. Problem: Fracture of middle of index finger of left hand. Fracture of middle upper right arm. Compound fracture at middle of left thigh. Both eyes injured by shot. In addition, the man is unable to use right leg. If asked to move his leg, it is seen that he is entirely helpless. Treat for this condition as you think best." Time limit, 15 minutes.

The judges awarded marks as follows to the 16 teams in the three events, the average of which decided the winner:

No. 5 Shaft, No. 6 Colliery Team and Subject

Erie Colliery Team, Mayfield District.

Team	District	Event No. 1	Event No. 2	Event No. 3	Aver.
Ewen Breaker.....	South Pittston	94	100	100	98
Old Forge Breaker..	Avoca	88	100	100	96
Erie Colliery.....	Mayfield	97	88	95	93¼
No. 2 Shaft.....	Dunmore	92	95	90	92⅓
No. 9 Breaker.....	North Pittston	97	84	95	92
Coray Slope.....	Avoca	97	88	90	91⅔
No. 10 Shaft.....	North Pittston	89	100	85	91⅓
Forest City Breaker	Forest City	90	89	95	91⅓
No. 1 Head.....	North Pittston	98	90	85	91
Old Forge No. 1....	Avoca	94	86	90	90
No. 2 Shaft.....	South Pittston	95	88	87	90
Old Forge No. 2.....	Avoca	82	100	85	89
No. 5 Shaft.....	South Pittston	95	90	75	86⅔
No. 1 Shaft.....	Dunmore	89	81	90	86⅓
No. 7 Shaft.....	North Pittston	95	78	82	85
New County and Gray Slope.....	Forest City	88	89	75	84

In the Individual contest, there was one representative from each of the six districts and the problem solved was as follows: "Fracture of lower jaw both sides, and wound 3 in. long, running across back of neck. Wound on top of left shoulder and extending across chest to upper end of breast bone. Apply a dressing with triangle to a downward dislocation of right shoulder."

The result of this event follows:

Individual	District	Percentage
Thomas Ross.....	North Pittston	95
John O'Malley.....	Mayfield	94
Moses Ballentine.....	Avoca	92
Alex Graham.....	South Pittston	80
W. G. Garigan.....	Dunmore	79
Delbert Burdick.....	Forest City	77

Following the contests, Dr. H. J. Mahon distributed the prizes.

Dr. F. F. Arndt was director of the contests. The other officials follow: Judges: Drs. W. G. Fulton, F. J. Bishop, B. B. Wormser and W. A. Peck. Timekeeper, F. C. Weichel. Recorder, F. D. Conover. Managers, Frank H. Coughlin, W. P. Jennings, Davis Girvin and H. T. Mullen.

Members of the different teams which took part were as follows:

No. 2 shaft Mt. Dunmore—William Bulger, captain; Matthew Richards, Andrew Callo, William Tweksbury, John Wallace, John Kline, subject.

Shaft No. 5, No. 6 colliery, Inkerman—Peter Hollihan, captain; John Purcell, Patrick Flaherty, William Lynch, Bernard Corcoran, Richard English, subject.

Ewen Breaker, Port Griffith, outside—William Davis, captain; Joseph Banbenburg, Harry Skiner, Anthony Polis, William Scott, Daniel Mullery, subject.

Colliery No. 10, Hughestown—Michael Noone, captain; William Hart, Thomas Walsh, Harry Toole, Michael Quinn, Thomas Maloney, subject.

Mayfield colliery—John O'Malley, captain; James McDonald, George Mahalcki, George Kehoe, Clement Farrell; Jeremiah Gallagher, subject.

Shaft No. 1, at colliery No. 9, Hughestown—Edward Quinn, captain; George Heimarch, James Flynn, Frank Scheiber, Charles Lahey, Edward McCloskey, subject.

Outside No. 9 breaker, Hughestown—Thomas Ross, captain; John Miller, Louis Heal, Harold Herbert, Arch Eshelman; Max Melcher, subject.

Leadville shaft, North Pittston—Alexander Tait, captain; James Scott, Patrick Walsh, Martin McGarry, John Cooper; James Toner, subject.

Old Forge breaker—Moses Ballentine, captain; Michael Quinn, Thomas Cranston, Harry Newton, William Bennett; George Robinson, subject.

Shaft No. 2, Old Forge—Henry Odgar, captain; William Odgar, Edward Slattery, Edward Finley, Joseph Shively; Max Stack, subject.

Shaft No. 1, Old Forge—John Lewis, captain; Frank Joyce, John Joyce, William Garrett, Charles Sherrer, Oscar Stetler, subject.

Shaft No. 1, Dunmore—Julius Thomous, captain; Thomas White, John Merrick, John Sagan, John Lakas, John Lock, subject.

Corey Slope, Old Forge—Frank Young, captain; William Tigue, William Major, Charles Boose, Edward Harrison, Walter Goldworthy, subject.

Forest City colliery, outside—James Johnson, captain; Earl Pancaust, David Evans, George Holmes, John Stork, David Williams, subject.

Gray slope, Forest City—John Jones, captain; Walter Johnson, David Simonson, George Carpenter, Robert Davis, Joseph Swallon, subject.

South Pittston No. 4—Bernard McDowell, captain; Robert Shelby, Daniel Brennan, Ben Howard, John Owens, Fred Jenning, subject.

The Four Judges

Left to right: Doctors B. B. Wormser, F. J. Bishop, W. A. Peck, W. G. Fulton.

Discussion By Readers

Keeping Rooms on Sights

Letter No. 2—Referring to the inquiry by Mine Foreman, COAL AGE, Aug. 22, p. 317, in regard to keeping rooms on sight, permit me to say that the only satisfactory system that I have ever seen used is to run a whitewashed line up the room on sight, as there suggested.

It is very little work to put in these whitewashed lines and extend them as the room advances. If any falls of rock or timber occur, at least a part of the line will be left remaining so that it can be extended when required. Where tracks are laid up the rooms, I consider that it is preferable to put the whitewashed lines over one of the rails. This rail should be at a fixed distance from the rib, depending somewhat on the system of mining, so that the miner will know that the rail which comes under the whitewashed line is such a distance from his rib. By using this system the rooms can be "kept on sight" and as the foreman watches the width of the rooms the pillars can be kept within a foot of their standard width.

In establishing the whitewashed line, for the first time, the engineers will set the sights the same as for ordinary sight driving; that is to say, by putting two plugs in the roof about three feet apart. In extending the whitewashed line, one man will go to the face with one end of the chalk line, while another man stands behind the sights and holds the other end of the line. The light in the face shows when the line has the proper course. The line should then be tightened and snapped against the roof. This leaves a faint mark, which should immediately be run over with a whitewash brush.

In extending the line again, all that is necessary to be done is to secure two points on the whitewashed line and use the chalk line, drawing it through these points and snapping it against the roof, as in the first instance. If this method is followed carefully the rooms and pillars will be kept a uniform width throughout, and it will only take a short time to educate the miner in this system.

J. F. MENZIES, Manager,
Carbon Hill Coal Co.

Carbonado, Wash.

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Letter No. 3—I was much interested in the inquiry in reference to driving rooms on sights, COAL AGE, Aug. 22, p. 317. Having had some experience along that line myself, I wish to say that we found it difficult to keep sights when these were placed in the roof. For this reason, we decided to set permanent stringers across the mouth of each room, about 4 ft. apart. When this was done, we got the engineer to put the room sights on these stringers and have had no trouble since from the sights being lost.

In our mine, the butt entries run N 66° E, and the rooms are turned off these entries at 90 deg. As the face cleats in the coal run nearly north and south, this makes a long corner at the face of the rooms. The sight line is kept about 2½ ft. from the straight rib.

I make a practice of sighting to the face of every working place once each week. If the face in any room is found to be off line, it is stopped at once, and the miner is ordered to take a skip off the rib sufficient to allow of the free passage of the sight line. This practice soon cures a careless miner, because the stopping of the face, cuts off his turn and he is unable to load the same number of cars, which considerably reduces his earnings.

Permit me to suggest that if Mine Foreman, from Kentucky, would provide himself and his assistants with a set of plumb bobs and check up the rooms in the mine once or twice a week, imposing a suitable penalty on those miners who disregard the sights, I believe he would have no further trouble with the holing through of one room into another.

D. W. SEIGHMAN, Fireboss,
McKeefrey C. & C. Co.

Martin, Penn.

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Problems in Rescue Apparatus

Letter No. 3—If the quotations of Mr. Elmer, COAL AGE, Aug. 22, p. 314, from an "eminent physiologist, in England," are to be taken as correct, it would mean that we will have to revise very considerably our ideas relative to rescue apparatus. These statements, also, seem to contradict what we have been taught very generally, in respect to the relative amounts of oxygen consumed and carbon dioxide produced in the act of breathing.

Authorities state that atmospheric air consists, by volume, of 79.1 parts nitrogen and 20.9 parts oxygen, with very small percentages of carbon dioxide. Numerous high authorities also state that the average of analyses of air expired from the lungs shows nitrogen, 79 parts; oxygen, 15.5 to 17 parts; and carbon dioxide 4 to 5.5 parts. I find it difficult to harmonize these generally accepted data, with the statements made by correspondent on p. 314. He states:

> The amount of carbonic acid (carbon dioxide) breathed out is the same as the amount of oxygen taken in when a man is oxidizing carbohydrate food, etc.

Again he states:

> If a man is oxidizing fat or protein, which is the chief constituent of meat, he will not expire quite as much carbonic acid (carbon dioxide) as he inspires oxygen. . . . At the most, less than one-third of the oxygen would be turned into water, etc.

Referring to the first of these statements, I drew attention, in a previous letter, COAL AGE, Vol. 5, p. 1062, that of the 120 liters per hr., supplied to the wearer of an apparatus, apparently only 50 liters are consumed in the production of carbon dioxide, the same volume of which is absorbed by the apparatus; and it was explained there, in answer to my inquiry, that the remaining 70 liters of oxygen supplied per hour combined with the hydrogen of numerous hydrocarbons present in the body, to produce water, much of which, as we know, drains from the apparatus. Certainly, this proves that more

oxygen is inhaled than carbon dioxide expired, in the act of breathing. The second statement of correspondent, also, bears out this conclusion.

It is natural to believe, from these data, that, while a portion of the oxygen inhaled is converted into carbon dioxide, another portion goes to form water, and still a considerable portion is exhaled unchanged.

W. H. MOORE.

Nanaimo, B. C., Canada.

The Reverse or Counter-Current Theory

Since writing my last letter (COAL AGE, Sept. 5, p. 398) in reply to an editorial reference to this subject, I have received my copy of COAL AGE for Aug. 22, and read with interest the article of Samuel Dean, p. 294. I notice that Mr. Dean refers to Mr. Verner's theory as the "Counter-Current Theory," and I desire to offer a few criticisms of his statements and conclusions.

In the synopsis, at the head of this article, it would have been well if it had been stated which of John Verner's conclusions had been "accepted" by the British Experimental Station. This would have given point to the argument and have made the article more specific in regard to the application of this theory to the solution of mine explosions. One is left wholly in the dark, however, in regard to what particular points or phases of the theory were regarded as acceptable by the British experimenters.

Again, it may be assumed from Mr. Dean's article that he attempts therein to prove that "there is an inrush of air, as well as an outrush, probably throughout the duration of all explosive phenomena." I have quoted this sweeping assertion from the synopsis at the head of the article. Had the word "all" been omitted, the statement might have been passed by without comment, although it must be admitted that the word "probably" somewhat modifies the assertion. The statement covering, as it does, *all* the phenomena attending an explosion is quite too broad for general acceptation.

Mr. Dean begins his argument abruptly by stating his conclusion that the experiment made for him by Doctor Wheeler, at the Eskmeals Testing Station, proved that the counter-current theory was quite correct. While some may agree with him in this view, to a certain extent, many will take exception to his conclusions, after considering the conditions surrounding the experiment.

The testing gallery used for this purpose was 39 in. in diameter and 400 ft. long and closed at one end. A cannon was placed 50 ft. from the closed end, charged with 1½ lb. of black powder and stemmed with 8 in. of dry clay. A mixture consisting of 70 per cent. coal dust and 30 per cent. incombustible fuller's earth was strewn along the gallery, a half-pound of dust being used per lineal foot. This dust extended from the cannon to within 20 ft. of the mouth of the gallery, or, say a distance of about 350 ft.

Anyone familiar with coal mining can judge how closely the arrangement in this experiment reproduced the actual conditions existing in a coal mine. In the first place, there was no current of air or ventilation in the tube. Again, there was a dead space of 50 ft. behind the cannon, and, as a result, when the cannon was discharged, the initial velocity of the flame caused an outward blast of dust; but, as soon as the air space behind the cannon was rendered partly vacuous by the outward rush of the blast from the cannon, there was naturally a counteraction that caused an inrush of air, bringing a fresh supply of oxygen into the tube. This gave rise to the first pulsation.

It is not so certain what caused the other pulsations, though it is not improbable that they show the ignition and explosion of more dust, following the first inrush of fresh air. It must be quite clear to any studious mind that there was not sufficient air in the tube for the complete combustion of the dust, which fact caused the flame to die out before reaching the mouth of the tube, leaving much dust that would be available for a second explosion of equal or even greater force than the blast from the cannon.

In my opinion, it is exceedingly improbable that the same result would have been obtained had the cannon been placed in the dead end of the tube. The old saying that "nature abhors a vacuum" is clearly exemplified by the inrush of the air following each blast.

Turning now from the Eskmeals experiments made for Mr. Dean, to those made at Altofts, in the larger and longer gallery, it is interesting to note that the interval between each of the photographs taken, at that time, was about $^1/_{22}$ of a second. These photographs are reproduced on plate 5 of the report of the Committee on British Coal-Dust Experiments, and will prove both interesting and instructive, in this connection. The total time occupied by the flame in traversing the tube was estimated to have been $^1/_5$ of a second; and it was stated that the subsequent combustion occupied about a second more.

It is worthy of note that in not a single one of these pictures is there any evidence of a reverse or counter-current. In my opinion, this is wholly explained from the fact that the conditions in the Altofts experiment were practically the same as those existing in the mine. In the Altofts experiment there was a ventilating current passing through the tube, corresponding to the air current in mine airways, which was not the case in the Eskmeals experiment. I believe that the ventilating current made it impossible for a reverse current to be set up, because of the sufficiency of the supply of oxygen for the combustion of the dust. The commencement of the vacuum or condensation stage of every explosion is clearly shown in Fig. 24, p. 30, of the British report to which I have referred.

The experiment made for Mr. Dean at Eskmeals would seem to support the theory of Donald Stuart; but the experiment to which I have referred at Altofts goes a long way toward proving its fallacy. The fact observed in every colliery explosion, that the flame of the explosion is mainly confined to the top or upper portion of the roadways, is clearly demonstrated by facts, since men are seldom burned below the knees and often not below the waist. The force of the explosion, however, is distributed over the whole sectional area of the roadway. In some mines, this may be attributed to the extra fineness of the coal dust lodged on the timbering; or, in gaseous mines, to the presence of small percentages of gas in the air close to the roof of the roadway.

JAMES ASHWORTH,
Mining Engineer.

Vancouver, B. C., Canada.

Heating of Coal

In reading the editorial entitled The Storage Problem, COAL AGE, Aug. 22, p. 306, my attention was attracted to the following paragraph:

In fact, that oxidation is not the important cause of heating is evidenced by the fact that coal is slow to become heated; yet all the deterioration in the earlier stages is due to oxidation. Later the coal becomes dried out in the sun and when it is moistened the heat of hydration probably causes it to fire, though other causes are possible.

I am unable to agree with some of these statements. In the first place, the deterioration, in the earlier stages of coal storage is not, by any means, due entirely to oxidation. Much of the deterioration observed in the coal, in respect to its calorific power, is undoubtedly due to the loss of heat units, which it experiences by the liberation of its methane. The deterioration in the heat value of the coal, from this cause, has been recently confirmed by the experiments of Parr and Baker, at the Experiment Station of the University of Illinois (Bulletin No. 32, 1909).

While it is true that oxidation is continually taking place in the coal, during the period of storage, this oxidation is not accompanied by a proportionate evolution of carbon dioxide, which points to the fact as probable that most of the oxygen absorbed by the coal enters into chemical combination with the resinous bodies contained therein; and, if this be true, there is a less production of heat in this combination than would result in the production of carbon dioxide by other forms of chemical reactions.

In the second place, since coal is a very poor conductor of heat, the sun's rays have little effect falling on the surface of the coal to impart heat to its mass. It is a significant fact that heating in coal piles never starts nearer the surface of the pile than 3 or 4 ft. For this reason, the drying of the coal stored in piles must be ascribed to other causes than the heat of the sun. As a matter of fact, continued observations on coal piles show that the coal on the interior of the pile is always damp and, consequently, can never become dehydrated so as to afford opportunity for further hydration to occur in the pile.

It is more probable that the heating, in the later stages of coal storage, may be ascribed to the absorption of oxygen, as carbon dioxide is then liberated in larger measure, accompanied by the evolution of much heat. It has been definitely proven that the production of carbon dioxide increases as the temperature rises, until the action eventually becomes autogenous or self-sustaining and the coal catches fire.

J. B. DE HART.

Coleman, Alta., Canada.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

Water Feeders—Water, like gas, not only permeates the softer and more porous rocks, but completely fills the interfoliations of the strata and all cracks and crevices, which form natural channels or underground waterways by which the water flows or drains into the mine. A fault or dislocation of the strata is almost invariably a natural channel that offers little resistance to the flow of water or gas.

A copious flow of water from a fault or from a particularly wet stratum in the rocks or from a crevice in the formations is termed a "feeder." The flow of water from such feeders is variable, being generally greater in wet than in dry seasons of the year. The flow from a water feeder may also be increased by the disturbance of the roof stratum, owing to the rapid development of the mine, particularly when an impervious roof is overlaid with watery strata, or the mine workings are extended beneath rivers, lakes or other bodies of water on the surface.

DITCHING

All mine roads and most passageways should be ditched on one or both sides of the entry or passage, in order to provide suitably for the natural drainage of the roadbed or floor. The lack of proper ditching of mine roads is the cause of much trouble and expense in the maintenance of the tracks, and, in many cases, is the unsuspected cause of the reduction in the daily output of a mine.

It may not, however, be always advisable to ditch a roadway laid on a hard **clay bottom.** The track should then be ballasted with rock or cinders. The disturbing of a clay bottom in a mine passageway often starts trouble from a continued and increasing tendency of the floor to heave. This tendency is more pronounced in some mines and localities than in others. Experience is always the best guide in practice.

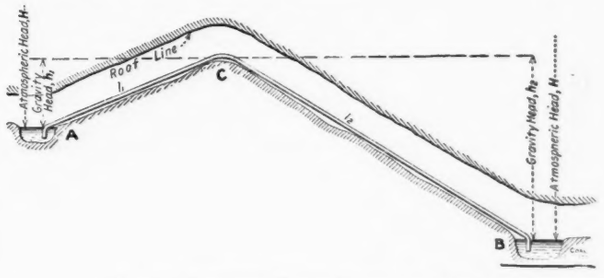
The flow of water in ditches is treated elsewhere; but this is unimportant in its relation to mine drainage, the matter of chief concern in mining work being to dig the ditches and to keep them clear of obstructions that would impede the flow of the water through them.

SIPHONING

The application of the principle of the siphon to mine drainage is of the greatest importance in respect to economy of operation. While ditching is an effective means of drainage in practically level seams or on roads of uniform grade, the process is not practicable when hills and swamps succeed one another in the development of the mine. This necessity for deep ditching is obvious when crossing a slight rise or "roll" in the seam; but the expense, which is often prohibitive, is avoided (when the fall is greater than the rise), by the use of a siphon or pipe line laid over the rise. In this case, it is necessary to collect the water in a sump or basin provided for the purpose, beyond the rise, which will enable the complete submergence of the mouth of the pipe in this basin, this being important in order to prevent air from entering the pipe.

The Coal Age Pocket Book

Principle of the Siphon—The action of the siphon depends on the difference in weight between two columns of water that would otherwise be in equilibrium. The two water columns are contained in the long and short legs, respectively, of a bent pipe, as illustrated in the accompanying figure, which shows a siphon pipe laid in a mine entry and connecting an upper basin A with a lower basin B, the two basins being separated by a rise of gronnd C that prevents the natural flow of water from A into B. The pipe being air-tight, the greater weight of water in the long leg CB overbalances the lesser weight in the short leg AC, and the water flows from A to B by gravity.



IDEAL SIPHON PIPE LINE IN MINE

Conditions and Requirements—It is of the utmost importance for the successful working of a siphon, that all the pipe joints shall be air-tight and that the ends of the pipe should both be submerged to such a depth below the surface of the water, in each basin, as to prevent the entrance of air to the pipe. The submergence required is naturally greater at the intake than at the discharge end of the pipe, owing to the flow of water, in the one case assisting and in the other opposing the entrance of air.

Effective Head of a Siphon—As indicated in the figure, the atmospheric pressure or head (H) is the same at each end of the pipe. The gravity head (h_1) or the vertical rise of the intake end is always less than the gravity head (h_2), which is the vertical fall of the discharge end. The former opposes, while the latter assists the flow of water in the siphon. These gravity heads are often spoken of as the **"suction head"** (h_1) and the **discharge head** (h_2), respectively. Since the atmospheric head (H) is the same at each end of the pipe, this may be disregarded when considering the pipe as a whole; and the effective head of the siphon is therefore the difference between the gravity heads (h_2—h_1).

Inquiries of General Interest

Drawbar Pull on Incline

I would like to ask what will be the drawbar pull, in hauling a loaded trip of 100 cars up a 4-per-cent. grade, under ordinary mining conditions. Each car weighs 1550 lb., and carries 1½ tons (3000 lb.) of coal. Also, what should be the size of the connecting links and of the rope to haul this load, under these conditions?

CHARTER SUBSCRIBER.

Heilwood, Penn.

The weight of the loaded trip, in this case, is

$$L = 100\ (1550 + 3000) = 455{,}000\ lb.$$

On small inclinations, say on grades of less than 10 per cent., the weight of the trip may be taken as the normal pressure of the load on the incline, in which case the coefficient of rolling friction, that in general mining practice may be assumed as $f = 0.025$, is added to the percentage of grade expressed as a decimal and the sum multiplied by the weight of the loaded trip, to obtain the drawbar pull; thus,

$P = 455{,}000\ (0.04 + 0.025) = 39{,}575$, say 30,000 *lb.*

Then, taking the drawbar pull as 30,000 lb. or 15 tons, the diameter (d) of round Swede iron, for an open link, may be calculated thus,

$$d = \sqrt{\frac{P}{6}} = \sqrt{\frac{15}{6}} = \sqrt{2.5} = 1.58\ in.$$

This formula assumes an average strength of Swede iron of 60,000 lb. per sq.in., and allows a factor of safety of about 7.5, for a steady pull; or somewhat less than 4, allowing for shock.

In order to determine the size of rope required to haul this trip, it is generally necessary to know the length of the incline, as the load on the rope is increased by its own weight and friction on the incline. But, in this case, the additional load due to the weight and friction of the rope, has been more than covered by taking the load as 30,000 lb. For example, assuming for trial that the rope weighs 2 lb. per lineal foot and the incline is 1000 ft. long, the total weight of the rope would be $2 \times 1000 = 2000$ lb., which would make the total load resting on the incline $455{,}000 + 2000 = 457{,}000$ lb.; and the load on the rope, at the top of the incline, is then $457{,}000 \times 0.065 = 29{,}705$ lb.

Wire-rope tables give the breaking load of a 6-strand, 7-wire, cast-steel haulage rope 1 in. in diameter, as 37 tons. Calling the safe working load L, in tons, and the factor of safety f, the breaking load is fL; and since the breaking load of a rope is proportional to the square of its diameter d,

$$d^2 : 1^2 :: fL : 37$$

and

$$d = \sqrt{\frac{fL}{37}}$$

The rope constants for 7-wire haulage ropes are as follows: Swede iron, 16; cast steel, 32; extra strong cast steel, 37; plow steel, 42. The constants for 19-wire hoisting ropes of the same grades are 17, 34, 39 and 44, respectively.

Therefore, taking the total load on the rope as 30,000 lb., and assuming a factor of safety, in this case, of 5, the diameter of a 6-strand, 7-wire haulage rope required for this haulage is

$$d = \sqrt{\frac{fL}{37}} = \sqrt{\frac{5 \times 15}{37}} = \sqrt{2.03} = 1.42,\ say\ 1.5\ in.$$

Anemometer Readings

I would very much appreciate an answer, through the columns of COAL AGE, to the following question:

What causes an anemometer to revolve faster when the dial is facing the air current, than when the air strikes the back of the instrument? When the dial faces the current, the instrument registers 1000 ft. per min., and when the back of the instrument is toward the air current, the registry is only 900 ft. per min.

D. W. SEIGHMAN, Fireboss,
McKeefrey C. & C. Co.

Martin, Penn.

In the use of the anemometer, in practice, it should be held at arm's length toward the wind, and in such position that the air strikes the back of the instrument. No obstruction is then offered to the air before it reaches the blades. It is important to hold the instrument so that the blades revolve in a plane normal to the air.

Every precaution must be taken to avoid the disturbance and deflection of the air before it strikes the instrument. To do this, the observer should face the side of the entry, so that his body will offer the least resistance to the air current. Holding the instrument, as stated, at arm's length toward the wind, the air striking its back, and holding his watch in the other hand, the observer touches the spring that throws the dial hand into gear, again releasing the dial, at the end of the time of observation, one or more minutes.

There are several things that may cause the disturbance and deflection of the air current before it reaches the instrument. In the first place, the body of the observer holding the instrument interferes seriously with the air travel, disturbing and deflecting the air before it reaches the instrument. However, when the face of the dial is toward the air, a still greater effect is produced by the outward radial deflection of the air striking this face. The dial deflects the air outward, radially, thereby increasing the pressure on the ends of the blades, thus giving to the vane a greater speed and producing a higher reading than would otherwise be registered.

This same question was answered some time ago in COAL AGE, Vol. 4, p. 871; but, owing to its importance, we are glad to explain the difficulty again. An instructive article in regard to the use of the anemometer will also be found, in the same volume, p. 655.

Examination Questions

Miscellaneous Questions

(*Answered by request*)

Ques.—What is meant by permissible explosives, and why are they termed thus?

Ans.—A permissible explosive, as defined by the Federal Bureau of Mines (Miner's Circular No. 6, p. 8), is any explosive similar in all respects to the sample that passed certain tests made by the U. S. Bureau of Mines and when used in accordance with the conditions prescribed by that bureau. The conditions and use prescribed by the Bureau are as follows:

1. That the explosive shall be, in all respects, similar to the sample submitted for test.
2. That the detonator used to explode the charge shall consist by weight of 90 parts of mercury fulminate and 10 parts of potassium chlorate, or their equivalents.
3. That the explosive, if frozen, shall be thoroughly thawed in a safe and suitable manner, before use.
4. That a charge shall be used not to exceed 1½ lb. (680 grams), which shall be properly tamped with clay or other noncombustible stemming.

Ques.—What are the advantages and disadvantages of the longwall retreating system of mining coal?

Ans.—The longwall retreating system of mining permits the relatively safe extraction of the coal in a seam overlaid with bad roof, or in seams of exceptional thickness or lying at a great depth below the surface. The system also possesses the advantage of reducing the expense for maintaining roadways in the mine, because these are all driven in solid coal. Also, less timber is required than in the advancing system.

The retreating system of longwall has the disadvantage of yielding slower returns on the capital invested, although this is partially offset by the reduced cost of production that results in most cases. Mining is generally safer in the retreating system than in the advancing system of longwall.

Ques.—What is the declination of the magnetic needle, in surveying, for Montana?

Ans.—The declination of the magnetic needle varies from 15 deg. E., in the southeast corner of the state, to about 22 deg. E., in the northwest corner. For central Montana, the present declination is about 19 deg. E.

Ques.—Is there any rule for determining the slant of timbers in pitching seams? Say, in a seam pitching 30 deg., at what slant should a timber be set?

Ans.—To withstand the roof pressure in a pitching seam, timbers should be set normal in the seam or perpendicular to the roof and floor; but, owing to the sliding movement of the roof down the pitch when the coal is extracted, all post timbers in pitching seams are "underset" or inclined slightly up the pitch, the amount varying with the inclination and thickness of the seam and depending also on conditions in the seam that affect the slipping tendency of the roof. No rule can be given but the underset of a post must be guided by experience, in any given locality.

Ques. 47—For what purpose is the air exhausted from the bulb of an incandescent lamp?

Ans.—The exhaustion of the air from the bulb of the lamp prevents the oxidation and destruction of the filament.

Ques.—How would you proceed to clear a shaft that is filled nearly to the top with carbonic acid gas?

Ans.—Assuming the shaft in question is being sunk, much of the gas may be bailed out with large buckets. This, however, is a slow process, and where the shaft generates large quantities of this gas, it is advisable to install a powerful blower that will exhaust the gas from the bottom of the shaft. The method sometimes employed, of pouring several barrels of water into the shaft, can only be used with success in a shallow shaft, and possesses the disadvantage that the water must be bailed out again. In sinking, under these conditions, a shaft should be equipped with air tubes and a suitable blower arranged to exhaust the air and gas.

Ques.—If 20,000 cu.ft. of air is passing per minute through a circular airway, 10 ft. in diameter, how many cubic feet per minute will the same pressure pass through an airway of the same length and 6 ft. in diameter, other conditions being the same?

Ans.—For circular airways of equal length and for the same pressure per square foot, the quantity of air circulated will vary as the square root of the fifth power of the diameter of the airway. In other words, under the given conditions, the quantity ratio is equal to the square root of the fifth power of the diameter ratio. Hence, in this case, calling the required quantity of air x,

$$\frac{x}{20{,}000} \sqrt{\left(\frac{6}{10}\right)^5} = \sqrt{0.6^5} = \sqrt{0.07776} = 0.2788+$$

$$x = 20{,}000 \times 0.2788 = 5576 \text{ } cu.ft. \text{ } per \text{ } min.$$

Ques.—An airway, 7000 ft. long and 6x8 ft. in section, is passing 20,000 cu.ft. of air per min. under a given pressure. What will be the sectional dimensions of this airway when enlarged in the same rectangular form, so as to pass 60,000 cu.ft. per min., under the same pressure?

Ans.—If enlarged in the same rectangular form, the cross-section of the enlarged airway will be similar to that of the original airway. For similar airways and for the same pressure producing circulation, like dimensions of the cross-section will vary as the fifth root of the square of the quantity of air in circulation. In other words, the ratio of change, for either the height or the width of the airway, will be equal to the fifth root of the square of the quantity ratio, which is, in this case,

$$\sqrt[5]{\left(\frac{60{,}000}{20{,}000}\right)^2} = \sqrt[5]{3^2} = \sqrt[5]{9} = 1.55$$

Therefore, the width of the enlarged airway will be $8 \times 1.55 = 12.4$ ft.; and the height $6 \times 1.55 = 9.3$ ft., making the required section of the enlarged airway 9.3 $\times$ 12.4 ft., in order to pass 60,000 cu.ft. of air per min., under the original pressure.

Coal and Coke News

Harrisburg, Penn.

Preparations are being made at Philadelphia harbor to ship 100,000 tons of coal to Greece, consigned to foreign buyers. Part of this order, which it is understood was secured by the Consolidation Coal Co., and the Pocahontas Fuel Co., will be filled from Virginia coal mines. In addition to the large sale of coal to Greece, it was reported, on Sept. 12, that J. H. Weaver & Co., of Philadelphia, had made a contract with the Navy Department at Washington for 200,000 tons of coal, mined exclusively in Pennsylvania, which will be shipped immediately from the Philadlephia port for use of American war vessels in the Mediterranean and Asiatic squadrons.

Berwind-White Coal Mining Co. and other big bituminous coal-producing operators, it is also understood, are receiving "queries" from foreign sources. These shipments of coal are regarded by operators only as preliminary to the enormous possibilities for the port of Philadelphia in the coal export trade that has been brought on by the European conflict.

Other shipments are already moving from Philadelphia on actual foreign orders, and operators have announced at the mines that concerns are shipping by the hundreds of tons to Brazil, Argentine and other South American countries. These countries, before the war, bought annually $55,000,000 of a total purchase of $60,000,000 a year from England. Now they are turning to the United States, and the big coal operators are wondering whether they can hold the trade when peace is restored.

In recent years, very little coal for the navy has gone through the Philadelphia port, as but little Pennsylvania coal was taken. The contract awarded to J. H. Weaver & Co. clearly shows that Pennsylvania coal is of the standard required by the Navy Department. Operators throughout the state are expressing considerable glee over the recognition by the government of the merits of the Pennsylvania fuel. All of this order, it is understood, will be supplied from mines in Cambria County, and it is the belief among operators that the state has reëstablished permanent relations with the Navy Department.

During the last week, six vessels were chartered to take Pennsylvania coal to South American ports and three to Piereaus, Greece. The European source of supply has been cut off, and recent dispatches from London indicate that coal is not being exported from Wales except in small quantities to Italy. These conditions, it is pointed out, give Pennsylvania and the other coal-producing states of the Atlantic coast an opportunity to not only meet this new South American demand, but at the same time to establish for the producers and dealers of Pennsylvania a permanent market for coal in other parts of the world.

Because of the fact that the English, French and Germans in South America have the system of interlocking directorates to a most effective degree, it was authoritatively pointed out that this might make it difficult for American companies to hold the coal trade when peace reigns again. The same set of men that are directors of the companies in South America needing the coal are directors of the mines abroad producing the fuel and directors of the steamship companies delivering it. But coal men of this country see no reason why they should not enter the South American field and retain a large part of it. They point to statistics which they say inspired them to make the fight. Of the $25,000,000 worth of coal imported into Argentina in 1912, $23,500,000 worth was from England, $381,000 worth from Germany and $783,000 worth from this country. In Brazil, the value of the coal imports for the same year was $18,500,000, of which $15,500,000 was from England and $2,700,000 from the United States. In Uruguay, where the coal imports amount to about $3,000,000, the conditions are about the same. In Chili, the coal imports in 1912 were $11,000,000 in value, of which $7,000,000 was from England, $278,000 from Germany, $503,000 from this country and the rest from Australia.

The United States now turns out from her mines practically 40 per cent. of the coal output of the world. American coal, it is pointed out, holds high rank, that of certain of the greater mining sections lying within easy reach of tidewater being considered equal to Cardiff coal for steaming purposes, and generally acceptable wherever thoroughly and impartially tested. The fact that the steamships plying between Europe and the United States bought last year approximately $25,000,000 worth of American coal for their own use on the ocean is an evidence that it compared favorably, at least, with the fuels of Europe.

Pennsylvania's Mineral Production

The reports of the mineral production made to Richard H. Hice, state geologist of Pennsylvania, show the production of 1913 was by far the greatest of record, exceeding the previous highest record by over $55,000,000.

In 1911, the total value of the mineral production of Pennsylvania ,excluding pig iron, coke and derived products, was $414,426,962. In 1912, this total value was $445,790,022, and in 1913 the total rose to $500,923,357, or almost one-fourth of the entire output of the United States.

Since the first records of the mineral production of the United States were made, Pennsylvania has stood at the top of the list and occupies a unique position in that respect, inasmuch as it greatly surpasses any other state. This production is almost equal to the combined output of Illinois, West Virginia, Ohio and California, the four next states as regards the value of their mineral wealth.

While Pennsylvania holds this unique position as a mineral producer on account of the enormous value of its coal output, which, in 1913, was $388,220,933, yet it must not be overlooked that if the entire coal output of the United States is disregarded, Pennsylvania is still the ranking state, exceeding California, which would be the second.

The anthracite and bituminous coal produced in 1913 was almost equal in value to the entire mineral production of West Virginia, Illinois and Ohio, the second, third and fourth producing states. The production of anthracite coal in 1913 was the highest on record, 81,818,680 long tons, exceeding the previous high-record mark by slightly more than 1,000,000 tons. The value at the mines was $195,181,127, exceeding the value of the production of 1912 by almost $17,500,000, and that of 1911 by $20,000,000.

The production of bituminous coal rose to an average of 700,000 tons for each day the mines were in operation. The total value of this production was $193,069,806, or $1.11 per net ton, the highest average price received for bituminous coal in the state for 30 years.

The total quantity of petroleum produced in Pennsylvania in 1913 was 7,927,137 barrels. The value of this oil was $19,716,148. There was a marked increase in the value of natural gas produced, the total value for the year being $21,695,845. The production of gasoline from natural gas is quite a new business, yet in 1913 gasoline was produced, which otherwise would have been lost, to the value of $405,186.

PENNSYLVANIA

Anthracite

Minersville—As a result of a brisk demand for anthracite coal, caused by the European war and the early cool weather, the Lehigh Valley Coal Co., on Sept. 11, ordered the immediate resumption of work at the Blackwood colliery. Work was suspended at that colliery in the middle of the summer, and it was not expected that the condition of the coal trade would warrant resumption of work until the middle of winter. Blackwood colliery produces a particularly good grade of anthracite. Six hundred men and boys will be given work.

Tamaqua—Orders were issued on Sept. 11, by the Lehigh Coal & Navigation Co., calling for resumption of the large washery at Hauto, Sept. 16. Coaldale washery will resume Oct. 1, and others throughout the Panther Creek Valley as soon as repairs can be made.

Scranton—Gas from a broken main of the Scranton Gas & Water Co., on Prospect Ave., recently leaked through the crevices in the ground and made its way into the workings of the National colliery of the Lackawanna Coal Co. This was discovered when miners with naked lights entered the vicinity and caused the gas to ignite. The break in the main evidently occurred in the morning after the fire boss had made his rounds.

Judge E. C. Newcomb recently issued an order restraining the Clearview Coal Co. from mining within 100 ft. of the line

of the No. 40 school building in North Scranton, so that the property may be saved.

Throop—The button strike of the Pancoast colliery has been called off. This affected approximately 1500 men there employed. The strike was caused by 17 mine workers at the Pancoast colliery who got in arrears as members of the union and were suspended under the rules. The rest of the workers refused to work with the 17 delinquents.

Bituminous

Kittanning—The Queenstown Coal Co., which has been engaged in opening its mines near Kittanning, is now ready to begin the shipment of coal.

Irwin—Notices have been received here recently by the unnaturalized Austrians, commanding them to return home for military duty, since their services are needed by their country. It is said that the Austrian government has the correct address of every reservist in this country. The men are given notice where they shall report and what regiment to join. Those in this immediate vicinity are instructed to go to a point near Lemberg.

Connellsville—The present rate of coke production is approximately 267,000 tons per week. Divided between the furnace and merchant interests the proportion being approximately 169,000 and 98,000 tons, respectively. No new transactions in contract furnace coke have been reported, and practically no business of this sort is in sight. On the other hand, with a single exception, no furnaces are likely to go out of blast in the near future.

Thomas D. Williams, mine inspector of the Sixth Bituminous District, recently caused the arrest of a superintendent who failed to provide two passageways from the operation under his charge, as provided by law. He has also brought action against two foremen who neglected to provide shelter spaces at 15-ft. intervals along haulageways. Furthermore he has prosecuted two miners who were accused of substituting open lights for the safety lamps supplied to them by the company.

Windber—First-Aid Instructor Allan S. Snyder of the Berwind-White Coal Mining Co., has announced a first-aid meeting will be held early in October by teams composed of the employes of that company. There is much rivalry between the miners of the various operations of this company in this section, and one of the biggest meets ever held by the company will result.

Blandburg—Langill & Edmundston, coal operators in Reade Township, on Sept. 9, secured an award of $11,686.86 from the Pennsylvania R.R. Co. on a charge of discrimination. They allege that the Pennsylvania R.R. Co. would not construct a siding to their mines and that partiality was shown in the awarding of coal cars. The case was the first of its kind tried in Cambria County. The plaintiffs asked for damages in the sum of $100,000.

Monongahela—After being closed down for more than five months undergoing repairs which have made it one of the greatest mines in the country the Mongah mine of the Pittsburgh Coal Co. was opened on Sept. 8. This mine when running full employs between 400 and 500 men. Since the mine closed down in April, the company has made improvements which by the time they are completed will cost in the neighborhood of $100,000. This does not include the $35,000, which was appropriated for the changing of the electrical power system.

California—Admitting that he had been guilty of violating the bituminous mining laws, Peter Brown, employed as a motorman in the Vesta No. 4 mine, was held for court recently. The information was made by Charles P. Byrne of the 21st Bituminous district, and accused Brown of having ridden on a loaded coal car when he was not motorman of the trip at various times within the past two years.

WEST VIRGINIA

Charleston—According to State Mine Inspector, Earl Henry, while the immediate effect of the European war has been to depress the West Virginia coal industry, the ultimate effect will be to help it materially. At present the inability of shippers to secure ocean-going vessels to handle coal for export has hampered a large possible movement, and the immediate industrial effect in this country, in the shape of lessened business, has also served to injure the coal trade. However, it is stated that with labor difficulties settled, prospects are excellent for the trade in West Virginia just now.

Eccles.—The bodies of two more victims of the April disaster have been recovered, in a portion of the mine which was flooded shortly after the explosion. This brings the number of bodies recovered up to 175. The mine is now operating with several hundred men at work, but as there are some portions which have not yet been fully cleaned up, it is possible that still other bodies will be found as work progresses.

Princeton—The coal traffic on the Virginian Ry. is becoming heavier and heavier each day. The train crews are running on full time, and the prospects are that the demand for coal from the Virginian section will continue to grow.

Clarksburg—Despite the reported business depression prevailing in commercial and industrial circles throughout the country, it is significant that the coal output in the Clarksburg district has materially increased. Before European hostilities were commenced the coal mines contiguous to this city were working only about two or three days each week. Within the last three weeks, however, the operations of the Consolidation Coal Co. have been working full time, while the same is true of the independent companies.

Bluefield—During the last fortnight, mining companies in the Pocahontas field have received numerous inquiries for coal from every part of the world. Particularly insistent are the demands from the great shipping ports of South America, the Straits Settlements, Japan and India and the ports of the Mediterranean. The price, according to the heads of some of the larger companies, is a secondary consideration, most inquiries bearing the agreement to pay the same prices, as have been paid for Welsh steam coals, which are ordinarily much higher than Pocahontas coals. It is stated that at all mining plants work is being conducted on full time and that thousands of men are needed for the Pocahontas region.

KENTUCKY

Lexington—The Kinkead Coal Co., of Lexington, has been awarded the contract for furnishing the Kentucky University at Lexington its coal supply for the current school year. Hywel Davies, business agent of the university, who is well known in the coal trade, received the bids and awarded the contract.

Louisville—Coal operators are much interested in plans for testing the Kentucky workmen's compensation law, which is now before the circuit court at Frankfort. The new system takes effect Jan. 1, and it is hoped that a decision will have been received from the court of appeals by that time, upholding the validity of the measure. Owing to the low rates offered for insurance under the law by the state, the stock insurance companies are opposing the measure strongly.

OHIO

Columbus—The Alma-Thacker Fuel Co., of Columbus, which was recently reorganized from the Pomeroy Fuel company has started to develop a tract of 2400 acres of coal land in Pike County, Kentucky. The property lies near the West Virginia line and the operating offices will be at Matewan, W. Va.

J. M. Roan, chief mine inspector of Ohio, is authority for the statement that hundreds of miners' children in the eastern Ohio district have been unable to attend school because of lack of clothing. A relief fund has been started.

Pomeroy—The Essex Coal Co. of Columbus will open another mine in the Pomeroy Bend district early in the spring. This mine, which will have a capacity of 1000 tons daily, will be a mile from the mine opened during the present year. It is located on a spur of the Kanawha & Michigan and will have modern equipment.

Wellsville—The four mines located near Wellsville, Ohio, which have been idle for more than four months, resumed operations recently.

Congo—Operations at Mine No. 301 of the Sunday Creek Co. were resumed recently after being idle for almost a year. The mine caught fire Oct. 31, 1913, and was sealed up under the orders of the Ohio Mine Inspector. Recently it was reopened and the fire was found to be extinguished. No. 302, which adjoins it was kept in operation all the time.

Cincinnati—The Otto Marmet Coal & Mining Co., of West Virginia, has filed a libel in the United States District Court here, as owner of the steamboat "Sallie Marmet," against the dredgeboat "Northern No. 2," owned by the Fieger-Austin Dredging Co., for damages alleged to have been sustained by two coal boats, loaded, in a collision which occurred on Sept. 1. About 21,000 bushels of Kanawha coal were lost, it is alleged, the total damages being fixed at $4500, for which it is asked that the dredge be sold. The dredge, which is engaged in government work on the Ohio, has been attached pursuant to the suit.

Cleveland—Operators with headquarters here have launched a vigorous protest against the proposal to tax freight bills three per cent. to afford revenues for the government.

pointing out that there is a vast movement of coal now going on, upon which prices were fixed by prior contracts, made, of course, without reference to any such tax. It is declared that the trade cannot stand this burden, which would fall wholly upon the shippers. Congress has been approached on the subject through the Ohio delegation

Bellaire—It has been reported that one of the large coal mines in eastern Ohio would shortly make a proposition to its men to resume operations at the Pittsburgh scale for mine-run coal. It is said, also, that a number of Belmont County operators are considering posting notices at their mines, offering the men a referendum vote on the acceptance of the Pittsburgh scale, and offering employment to all who care to go back to work on those terms.

ILLINOIS

Lewiston—It is stated that within a short time coal will in all probability be mined on a large scale north of Lewiston, and the opening of this operation should add several hundred people to that town's population. It is alleged that John Skinner of Astoria, president of the Farmers' Bank, is backing this new enterprise.

OKLAHOMA

Bartlesville—It is believed by certain parties that coal in considerable quantities underlies the land south of Caney, and it is said that this territory will be developed. Already it is reported that a large acreage between Caney and Wann has been purchased, the parties so doing negotiating for other large tracts. Development of the property will begin as soon as some additional lands are secured.

COLORADO

Denver—The Policy Committee of the United Mine Workers of America recently called a convention of miners to meet in Trinidad, Sept. 15, to act on the truce terms submitted by President Wilson for ending the Colorado coal strike. Representatives of the mine operators also called a conference to consider and reply to the President's proposals.

FOREIGN NEWS

Toronto, Canada—The coal mining industry of Nova Scotia is more active than usual, orders having increased owing to the war. The output of the Acadia Coal Co. of New Glasgow for August was 30,470 tons, an increase of over 3000 tons over July and sales totalled 29,500 tons, an increase of 5000 tons. The output for August of the Intercolonial Coal Co. was 20,000 tons.

Cardiff, Wales—It is said that the British Admiralty has sent a representative to Cardiff to inform all shippers of high-grade Admiralty coal that the Government demands first option on all shipments. A certain number of cargoes have already been taken over under this order and are being laden for government account in vessels chartered by the Admiralty on time limits. The price paid is said to be $5.30 per long ton, and shippers are being indemnified against private claims for breach of contract. The chartering terms are $3.27 per gross registered ton per month for vessels up to 2200 tons and $3.03 for larger craft.

TRADE CATALOGS

Wolf Safety Lamp Co. of America, Inc., 47-49 West St., New York. Catalog. "Wolf safety lamps." Illustrated, 40 pp., 8x10 in.

The American Concentrator Co., Springfield, Ohio. "New Century Disintegrating and Washing Screen." Eleven pages, 6x9 in.; illustrated.

The Jeffrey Manufacturing Co., Columbus, Ohio. Bulletin No. 126. "Jeffrey Fans for Mine Ventilation." Thirty-one pages, 6x9 in.; illustrated.

Ingersoll-Rand Co., 11 Broadway, New York. Form No. 3024. Ingersoll-Rogler valves for air compressing cylinders. Illustrated, 28 pp., 6x9 in. Form No. 3030. Class ER-1 Ingersoll-Rogler air compressors. Illustrated, 20 pp., 6x9 in.

PERSONALS

H. J. Heywood, manager for the W. A. Gosline Coal Co., of Toledo, has been elected president of the National Coal Trade Golf Association, which was organized at the Country Club at Evanston, Ill., during the second annual national tournament of the coal trade golfers held there recently.

W. K. Field, president of the Pittsburgh Coal Co., has returned home from a visit to Europe of several weeks for recreation and on business.

John P. White and William J. Green, international president and secretary-treasurer, respectively, of the United Mine Workers of America, expect to tour the anthracite regions of Pennsylvania during the present month. Unless something unforeseen happens in the affairs of the union, Messrs. White and Green will remain in Scranton for several days addressing mass meetings in the city and vicinity.

R. Y. Muir, inspector of the 8th District in the Department of Mines of West Virginia, has resigned his position to take effect, Sept. 30, and accepted a similar position with the New River & Pocahontas Consolidated Coal Co., with headquarters at Berwind. John I. Absalom, of Montgomery, has been appointed as inspector to fill the vacancy made by Mr. Muir's resignation. He will begin his work Oct. 1.

OBITUARY

Thomas Lomax, one of the owners of the Lomax Bros. mine, near McArthur, Ohio, was instantly killed recently by a fall of slate in the mine. A shot blew away the supports and the roof fell.

James R. Black, aged 55 years, of Forward Township, Allegheny County, Penn., a prominent coal operator, died recently at the Memorial Hospital in Monongahela, death coming as the result of cancer of the liver and stomach. The remains were taken to Rices Landing for interment.

Lewis A. Powelson, assistant general agent of the Lehigh & Wilkes-Barre Coal Co., died recently after an illness of several months. Mr. Powelson was a native of New Brunswick, N. J., and at the time of his death was about 70 years of age. He became identified with the coal trade some 45 years ago, entering the employ of the Wilkes-Barre Coal & Iron Co., in its New York office in 1868 or 1869.

Charles Henninger, an assistant foreman at the Colbert colliery, at Shamokin, Pennsylvania, was instantly killed on Sept. 10, when he fell down a manway, a distance of 150 ft. He was "chasing gas" when he was overcome and stumbling pitched headforemost to the bottom of the manway, which was almost perpendicular. His neck was broken. A widow and six small children survive. His body was discovered by his brother, who was working in the same section of the mine.

CONSTRUCTION NEWS

Pineville, Ky.—The Continental Coal Corporation is planning to install a gasoline or acetylene lighting system in its commissary at Arjay, Ky., and is now getting prices on the equipment. F. M. Meadows, purchasing agent, is located at Straight Creek, Ky.

Chattanooga, Tenn.—The Chattanooga Gas & Coal Products Co. will let contracts in the immediate future, it is announced for the construction of its plant, which will manufacture coke and other products of coal. The chamber of commerce is furnishing the site, it is reported, and has secured an agreement from the company to begin work on the plant by Sept. 30.

New Orleans, La.—To facilitate the loading of coal from Alabama fields onto vessels at New Orleans, it is officially announced that the Illinois Central R.R. and the Southern Ry. will each erect tipples at New Orleans. The appropriations for the work have not been officially announced, although it is the general belief that it will require quite an amount of money to arrange facilities for the proper handling of the coal. Both the Illinois Central and the Southern have direct lines from the Birmingham fields to New Orleans, and it is presumed that they are taking this step in the face of the fact that as soon as work on Lock No. 17 is completed that Alabama can put coal into New Orleans by water. The tipples will be of structural steel, equipped with belt conveyers on which the coal will be dumped, thus discharging the entire car into the vessel with one operation.

Logansport, Penn.—The Allegheny River Mining Co., of which Dwight C. Morgan is president, and Fred Norman chief engineer, recently awarded the contract for a large tipple for the Nicholson No. 1 mine, to the Link Belt Co., of Philadelphia. This installation will be located on an exten-

sion of the Pittsburgh and Shawmut Ry., from Kittaning to Freeport. The coal will come from the mines in trips of 30 to 40 cars, will be dumped into hoppers and by means of feeders will be delivered to two inclined apron conveyors, the top section of which will travel horizontally for some distance to afford ample picking surface. From these conveyors the coal is delivered to shaking screens, where it will be sized and from there it goes to bins and is delivered to the railroad cars. The entire outfit will be of steel construction, of the latest design and as nearly fireproof as possible.

NEW INCORPORATIONS

Novinger, Mo.—The Davis Creek Coal Co. has been incorporated with a capital of $75,000 to develop coal land.

Indianapolis, Ind.—The S. W. Little Coal Co., of Vanderburg County, has decreased its capital from $300,000 to $150,000.

Pineville, Ky.—The Martin's Ford Coal Co. has filed amended articles of incorporation, increasing its capitalization from $40,000 to $60,000.

Red Ash, Va.—The Raven Collieries Co. has been incorporated with a capital of $15,000 to $50,000 for the purpose of coal mining. The officers are C. M. Rudder, Jr., president; J. S. Kahle, secretary, both of Bluefield, W. Va.

Jellico, Tenn.—The Jellico Coal & R.R. Co. has been incorporated with an authorized capital stock of $1,000,000. The firm has purchased 15,000 acres of coal and timber land in Kentucky and Tennessee, and will lease to corporations for development. It will also construct a standard gage railroad to connect the Queen and Crescent route south of Pine Knot with the Southern and the Louisville & Nashville railways.

INDUSTRIAL NEWS

New York, N. Y.—The Mashek Engineering Co., 90 West St., N. Y., recently sold to the Maryland Steel Co., two 22 tons per hour capacity briquette presses. These will be shipped and installed immediately.

Birmingham, Ala.—The Birmingham Fuel & Iron Co. reports closing a contract with the Louisiana Railway & Navigation Co. for 50,000 tons of steam coal for delivery over the next 12 months. This contract has for many years been with Western Kentucky operators.

Harrisburg, Penn.—The shipments of anthracite over the leading coal roads during the month of August reached the total of 5,483,743 tons, as compared with $5,369,900 tons in August of last year. For the eight months ended Aug. 31, the total shipments amounted to 43,821,389 tons.

Cincinnati, Ohio—Former Governor Judson Harmon and Rufus B. Smith, receivers for the Cincinnati, Hamilton & Dayton R.R. Co., have applied to the courts for permission to issue $3,000,000 recevers' certificates to purchase new equipment in the line of locomotives and coal cars.

Fayetteville, W. Va.—The number of freight cars loaded with coal and run into Clifton Forge during the past week, shows an increase over the corresponding period of last year. The total number amounted to 4291, the average for each day during the week being 613. During the same week of last year the average was 457.

Knoxville, Tenn.—Officials of the United Mine Workers of America, District No. 19, recently in a conference with coal operators representing Eastern Kentucky, renewed the wage scale on the terms that previously prevailed. A similar conference was scheduled for Oswego with the operators of the Jellico District.

Louisville, Ky.—The towboat Enterprise, belonging to the Monongahela River Consolidated Coal & Coke Co., struck an obstruction in the Ohio River, Sept. 11, and sank opposite 35th St. Capt. G. W. Shaw, manager of the Monongahela at Louisville, said that arrangements would be made to float the boat at once. It is one of the largest operating in the river trade.

Washington, D. C.—Hearings before the Interstate Commerce Commission's investigation into allegations that coal roads have established embargos resulting in discriminations against shippers will begin before commissioner Daniels at Chicago, Jan. 20, 1915. Shippers and carriers have been invited to forward suggestions as to the points to be covered and will be given an opportunity to be heard.

Pittsburgh, Penn.—A deal has just been completed, whereby Joseph L. Styber, of Pittsburgh, Penn., and Charles L. Wather, of Woodlawn, Penn., have sold to John C. Shirer, of Columbus, Ohio, vice-president of the National Coal & Fuel Supply Co., of Columbus, 1280 acres of coal land in the Buchanan County, West Virginia, district for $52,000 cash. The coal is the Pocahontas vein and the property lies near Grundy, the county seat of Buchanan County.

Columbus, Ohio—It is believed that a conference of railroad and traffic managers will be held in Columbus the latter part of September to reach a conclusion as to what increased freight rates on interstate shipments, if any, shall be made by railroad companies in Ohio. Since the five per cent. increase allowed by the Interstate Commerce Commission there is considerable difficulty in apportioning the increase. Coal rates may be affected slightly.

Washington, D. C.—In order to take advantage of the demand which will be made upon it by foreign nations during the European war, the Consolidation Coal Co. has arranged to operate 207 offices in various cities in Europe. Two representatives have been chosen to go abroad to arrange for the opening of these offices. The letters passport asked for and secured for these gentlemen were sent by the ambassadors of Great Britain, Spain, France, Italy and Portugal.

Columbus, Ohio—The hearing on the application of B. F. Nigh, secretary of the Michigan-Indiana-Ohio Coal Association, for a change in the reweighing rules, pending before the Ohio Public Utilities Commission set for Sept. 25, has been postponed upon the request of the Baltimore & Ohio R.R. officials. This was agreed to by Mr. Nigh. The request for the postponement was based on the fact that there is an effort being made to agree on uniform reweighing rules for the entire eatsrn part of the country.

Washington, D. C.—Officials of the weather bureau and students of sun spots at the United States Naval Observatory are attributing the present cold weather to the extremely large spots now present upon the sun. The records indicate that these appear in regular cycles, and corresponding meteorological reports indicate that when these spots are present in great size the weather becomes either warmer or cooler. There are, however, variations more or less decided due to local terrestrial conditions from this rule.

Connellsville, Penn.—The iron trade is not at present encouraging to the coke makers of the Connellsville region. It is stated that coke producers are keeping down the size of their output and from present indications a further curtailment, though a slight one will take place in view of the present slackness in the demand. While stacks have been blown out, stock coke has been accumulating and although several furnaces are scheduled to blow in shortly, attention is directed to the fact that they may not use Connellsville coke as fuel.

New York, N. Y.—The conditions prevailing in Europe at the present time have practically caused the suspension of transportation between the continent and the United States. The materials necessary for the manufacture of brattice cloth, as well as the cloth itself in the manufactured state have been held up, and the stocks in this country have suffered heavy drains on account of everyone wanting to stock up before the supply in this country had been sold out. There are, however, some stocks still remaining in most of the widths and in the regular qualities.

Norfolk, Va.—The coal mines of West Virginia are now largely supplying Europe with fuel through the ports of Norfolk and Newport News. Ten vessels all flying the flags of foreign nations recently arrived and anchored off the coal piers at Lambert's Point and Sewals Point awaiting an opportunity to get under the chutes to take on cargoes. Among the recent arrivals for coal are the Italian steamer, "Anada"; the Greek steamer, "Engenies"; the British steamers, "Etaline" and "Leslie," and the Norwegian steamer, "Bygland." All of these ships have or will be loaded with coal for English, French and Grecian ports.

Pensacola, Fla.—Captain Barrow of the coast steamer "Tawang Tarpon," recently arrived in Pensacola and reported sighting a cruiser anchored some miles out from Pensacola. While the vessel had no flags flying, it is believed that it was a German cruiser waiting for coal that left Pensacola a few days ago. The Hamburg-American (German) steamer "Navarre" recently left Pensacola for Pernambuco with 6000 tons of coal which was paid for in gold, but instead of going to Pernambuco headed toward the cruiser, and it is believed delivered her the coal. The "Navarre" has since then made several trips with coal, which is believed to be for the cruisers standing out from Pensacola.

Coal Trade Reviews

General Review

Anthracite slowing down to a more normal basis but an active winter anticipated. Bituminous showing indications of heaviness in all directions. Export business relieves the tension at some points. Domestic grades steadying up while the steam sizes are in excess supply and weak.

The customary month-end rush for coal, supplemented by some record breaking low temperatures, precipitated an active situation in the anthracite trade over the first part of the current month. The market has now steadied down to a more normal basis, but full time operations are the rule at the collieries and there are few sales at concessions on the regular circular. There is accumulating evidence of postponed summer buying on the part of domestic consumers so that the season is opening with less than the usual supplies on hand. The Lake movement to the Northwest is also considerably less than requirements and it is possible that rail shipments may have to be resorted to before spring. The winter outlook in hard coal has seldom been more favorable.

There are unmistakable evidences of adverse developments in the bituminous trade. Coal is now being released in markets where there were recently strong indications of a shortage. Though scarcely perceptible at some points, the slowing down is general in all directions. Heavy export shipments at a few of the Atlantic Coast ports is the only development of a constructive nature and this, of course, does not help the markets suffering from the restricted consumption among steam users. This foreign business is notably heavy at Hampton Roads and from the amount of chartering there are no indications of any let up. But in other lines the inquiry for both current and future shipments has disappeared almost entirely and operators are frankly regretting their cautious position when orders were recently plentiful.

The curtailment in general manufacturing in the Pittsburgh district, supplemented by an abnormally lean season in Lake trade has created a dull situation there; demand is even further reduced and quoted prices are purely nominal. With the Canadian markets at a complete standstill and no prospects of any improvement in sight the outlook is not encouraging.

Steam grades are uniformly heavy throughout Ohio whereas the domestic sizes are in short supply. An increased demand from the Northwest has developed which, together with a stocking movement among householders, has resulted in a heavy demand for the screened grades. On the other hand, general manufacturing and steam consumption is far below normal and the problem of finding a disposal for the excessive production of these sizes, occasioned by the large output of domestic coals, is becoming increasingly difficult. The market on the steam sizes is approaching demoralization.

The Southern market is also feeling the effects of the slowing up in manufacturing, shipments being confined closely to contracts and some demurrage coal beginning to appear. However mines are on a fair running schedule and there is considerable business being negotiated with South America which is creating an optomistic feeling in trade circles.

The general discrepancy in the demand between steam and domestic coals has reached its highest development in the Middle Western field. While the domestics are steady to firm the steam grades are under heavy pressure and threatening to touch new low levels.

ATLANTIC SEABOARD

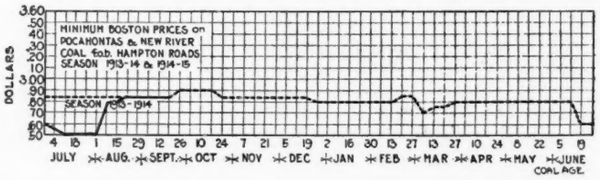
BOSTON

A dull period in Hampton Roads coals coastwise, although export demand holds up fairly well. Georges Creek also slackens some but prices show no change. Anthracite passes through a mid-month dullness.

Bituminous—The strong market predicted a month ago is slow in developing. Coastwise the movement has slackened again and were it not for the active export trade the market here would be a precarious situation. The off-shore demand is holding out well and prices are firm at $2.85@3 for Pocahontas and New River at Hampton Roads. The lower figure is still the ruling price for cargoes to New England but there is almost an entire absence of inquiry for both the present and the near future.

Inquiry at the distributing points for inland delivery continues light also. Few of the large consumers are making any heavy draft on their supplies and it is hard to see any buying power ahead for some time. In almost every direction there has been a marked let-up in bituminous, and shippers who declined orders a few weeks ago are repenting of their extreme caution.

That the Georges Creek coals are sharing the dullness to some extent appears in renewed shipments to Philadelphia and New York for coastwise loading. In other words, the over-sea business is not now absorbing the entire output and coal will be available for requisitions here that looked for a time as if they might be neglected.


MINIMUM BOSTON PRICES on POCAHONTAS & NEW RIVER COAL fob. HAMPTON ROADS SEASON 1913-14 & 1914-15
DOLLARS
SEASON 1913-1914
JULY AUG. SEPT. OCT NOV DEC JAN FEB MAR APR MAY JUNE
COAL AGE

Aside from short periods of car shortage the Pennsylvania operators seem to be enjoying a fair volume of business. There is a lull for the moment but the opinion is that present price levels will be maintained on the grades that have regular established markets.

Water Freights have eased off to the range that prevailed prior to Aug. 1, 60@65c. Hampton Roads to Boston on fair sized tonnage. The flurried inquiry of a few weeks ago seems to have entirely disappeared, and vessels are as much a drug on the market as at any time in the early season.

Anthracite—The early September demand seems to have been met with no difficulty and just now there is a hiatus in hard coal shipments for a week or so until the last of the month business starts in. The companies are well supplied with orders for loading after Sept. 20, but meanwhile there is a dull period that was hardly looked for. A few days of cool weather would accomplish a lot for the present market. Stove size, however, seems in no better supply.

Current quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*.....	$0.90@1.50	$1.25@1.65	$1.67@1.77	
Philadelphia*.....	2.15@2.80	2.50@2.90	2.92@3.02	
New York*.....	2.40@3.10	2.80@3.20	3.22@3.32	
Baltimore*.....	.....	.....	2.85@2.95	
Hampton Roads*.	.....	.....	.....	$2.85@2.95
Boston†.....	.....	.....	.....	3.63@3.78
Providence†.....	.....	.....	.....	3.68@3.78

*F.o.b. †On cars.

NEW YORK

Bituminous quiet but steady. Expected improvement fails to materialize but the market is well maintained. Anthracite has slowed down materially as compared with the month-end rush. Full circular price prevails and mines running up to maximum capacity.

Bituminous—The bituminous market continues quiet and there is little demand for spot coal, but on the other hand there is no accumulation of consequence and there is an absence of demurrage coal at the piers to be sacrificed at low prices. There is a fair movement on contract shipments. While it is difficult to estimate the amount of tonnage moving on this class of business, it is probably safe to say that contractors are taking perhaps 75 to 80% of the normal.

In some quarters an increase in price and a stiffening of the market has been looked for on account of the demand for export coal. In view of the fact that the English mines are getting out a practically normal tonnage, and the further fact that there are now plenty of bottoms available, there has been a decided easing off in the demand in this direction; this undoubtedly has a depressing effect on the market here which is tributary to Pennsylvania coals.

In fact the loss of bunker business in New York Harbor, on account of the tieing up of shipping, has been so heavy that it will much more than offset any additional off-shore trade that may have been gained.

Car supply is still good and it is generally conceded that we will not have any great shortage in the immediate future. There is, therefore, no reason to expect any great inflation of prices on soft coal this fall and those who have their tonnages contracted are fortunate under the conditions.

There has been practically no change in prices of coal at tidewater or along the line for Eastern movement and we continue nominal quotations of last week as follows: West Virginia steam, $2.50@2.60; fair grades Pennsylvania, $2.55 @2.65; good grades of Pennsylvania, $2.70@2.80; best Miller Pennsylvania, $3.10@3.15; Georges Creek, $3.15@3.25.

Anthracite—The anthracite situation is somewhat weaker. The war scare, together with the fact that a great many dealers wished to take advantage of the last advance of ten cents, created heavy buying during the latter part of August which was abnormal for that time of the year. The orders in some quarters were up to the winter demand and it would naturally follow that the business at this time would be a little lighter. The conditions are, however, by no means discouraging as anthracite coal is moving in practically all sizes at about circular prices and the mines are all operating on full time. It must be remembered that each day now brings us nearer to the October demand which is always heavy, being, as a rule, about the best month in the anthracite year. The weather is open and the movement of coal is in no way hampered either at the mines or along the line.

Stove size continues in heavy demand and few shippers will accept orders for it unless accompanied by a proportion of egg or chestnut. Of the three sizes, egg is a little heavy. The movement of pea to rail points has improved materially and with the advent of any cold weather this size will unquestionably be in strong demand in the New York market.

The retail trade locally is in fair volume, but inasmuch as this market is considerably nearer the mines than the more distant points in the East, North, and West, there has not been the urgent demand here that has existed along the line; New England and Western points figure on two to three weeks for delivery.

The demand for steam sizes in the better grades continues good, whereas the inferior coals are still a drug on the market, although there is probably less accumulation at tidewater than for some time.

The market is now quotable about as follows:

	Upper Ports		Lower Ports	
	Circular	Individual	Circular	Individual
Broken	$5.10	$4.60@5.10	$5.05	$4.55@5.05
Egg	5.35	5.15@5.35	5.30	5.00@5.30
Stove	5.35	5.35@5.45	5 30	5.30@5.40
Chestnut	5.60	5.45@5.60	5.55	5.30@5.55
Pea	3.55	3.45@3.55	3.50	3.40@3.50
Buckwheat	2.80	2.65@2.80	2.50@2.75	2.10@2.75
Rice	2.30	2.15@2.30	2.00@2.25	1.50@2.25
Barley	1.80	1.70@1.80	1.75	1.45@1.75

PHILADELPHIA

Cool weather increasing anthracite deliveries, both wholesale and retail. Prices well maintained on all sizes. Unusually heavy business anticipated this winter.

Anthracite—The cool weather has had the effect of stimulating the anthracite trade. Householders with empty bins found the evenings rather uncomfortable, owing to a temperature as low as 40°, and a visit to the coal dealers was the result. It is undoubtedly a fact that domestic consumers postponed purchases this year, as many dealers claim that the demand during the spring months was not as heavy as in previous years. The fall and winter business is, therefore, likely to show a substantial increase over the corresponding period of last year. Prices on all sizes are well maintained, with the exception of special prices to move coal that is likely to incur demurrage.

Tidewater business continues good. While the orders are not coming in with such rapidity as to cause any unusual delay in filling, at the same time the volume of business about keeps the large fleet of barges moving from this port. Prices rule about as follows:

	Circular	Individual
Broken	$4.75	$4.75
Egg	5.00	5.00
Stove	5.00	5.10
Chestnut	5.25	5.00 @ 5.10

BALTIMORE

Some improvement is noted. Exports are still increasing. Demand generally stronger and price list a little stiffer.

There is less inclination to let go of coal at sacrifice figures, and it is gradually developing that there is more inquiry. The price list shows a slight improvement. West Virginia gas slack, that recently sold as low as 45c. in spots, is now generally commanding ten cents or better. Gas three-quarter is holding firm at from 85 to 90c., and steam coals of West Virginia are selling around 95c. and $1 at the mines. Pennsylvania low-grade coals were still procurable at about $1, with medium grades calling for from $1.10 to $1.20 and best coals at $1.35.

The export business keeps increasing. Considerable coal is being loaded here for South America and Mediterranean ports. The charter list for the next two weeks loading also assures a continuance of this trade on an extensive scale. While two or three large firms continue to ship the bulk of this business, several smaller ones are known to be negotiating for European or South American connections.

The Anthracite Trade is also showing signs of awakening. While ordering is not yet extensive, cool weather has stimulated interest and small-lot orders are noted. Supply of some sizes is limited. The mines cannot supply all orders in full for the present.

In the coastwise trade there has been an inclination to tighten rates under a slightly increased movement to south Atlantic and gulf ports. The rates in some cases are ten to twenty cents over those quoted several weeks ago. Northerly rates have held about the same for the past few weks.

HAMPTON ROADS

Export shipments continue heavy, with a good coastwise movement. Government taking coal for use of fleet. Prices firm and there is about a normal supply of coal on hand.

The movement of coal from Tidewater still continues to show up exceedingly well, large shipments of both export and coastwise being made. Shipments during the week have not been so heavy to the South American markets, although some have moved to Brazil and the Argentine. Prices are remaining firm, and while it is understood that $3 is being asked by some of the suppliers, it is not believed that many sales are being made at this figure, and it is more than probable that $2.85 to $2.90 is the prevailing rate.

Export shipments for the week have gone to Port Said, St. Lucia, Port of Spain, Cristobal, Santiago, Buenos Aires, St. Thomas, Havana, Genoa, Piraeus, Naples, Para, Manaos, Georgetown, Gothenburg and Kingston. It is understood that the shipment moving to Port Said, Egypt, is for Dutch vessels trading there which have been using Welsh coal; war conditions have made it difficult for them to secure this grade now.

The accumulation of coal at the various railway yards is slightly above normal, but there is quite a large amount of tonnage in port and about due which will greatly reduce this.

LAKE MARKETS

PITTSBURGH

Demand decreased slightly and no stimuli given by the heavier exports from other districts. Mining operations at not over 60% of capacity, and prices as generally cut as before.

The Pittsburgh district has felt no favorable effects from the larger export trade being done by Pocahontas and other districts, while on the other hand it is suffering from the war through a curtailment in the domestic demand. Industrial operations have all slowed down and promise to decrease further. All hopes of an improvement in the Lake trade have naturally been abandoned, for the next development will naturally be curtailment of shipments as the end of the season approaches. Domestic demand has not opened up to any extent, and with line demand decreased generally and Lake shipments poor the Pittsburgh district as a whole has lost ground.

Prices are cut as badly as ever, mine-run selling down nearly to $1, with slack at 50@60c. Operations are at not over 60% of capacity, against about 65% for two or three weeks past. Circular prices, purely nominal, remain: Slack, 50c.; nut and slack, $1.05; nut, $1.25; mine-run, $1.30; ¾-in., $1.40; 1¼-in., $1.50, per ton at mine, Pittsburgh district.

BUFFALO

Much complaint from the bituminous trade. Overstocks and poor manufacturing conditions cut down sales. Canadian buying less than in this country. Anthracite becoming more active. Tonnage scarce in the Lake trade.

Bituminous—Few shippers are expressing satisfaction with their trade. There is too much coal in the hands of the consumers and consumption is relatively light. The mines are running irregular, keeping production down to avoid car service. The Canadian market is growing worse from week

to week. Many shippers are now exacting prepayment for everything sold there, and with money so scarce and heavy contributions for war purposes now being made, it looks as though the Canadian market will be tied up for a long time. This is a serious matter for Buffalo. Interest is now centered on the trade of South America, but there are many obstacles in this direction.

There is a special dullness in the slack coal trade at present, sizes remaining as usual. Quotations are $2.80 for Pittsburgh lump, $2.70 for three-quarter, $2.55 for mine-run and $2.15 for slack. Allegheny Valley sizes are about 25c. lower than Pittsburgh, with slack about on a par with it.

Anthracite—The fall trade is setting in fairly strong and the movement is expected to be up to normal. In some sections there was coal carried over last winter, and in others some special buying has been done on account of war conditions, but otherwise the trade promises to be normal. Sellers of independent anthracite report that they can dispose of all their coal at full circular prices, and they look for it to go above circular as soon as the demand becomes stronger. There is complaint on the part of anthracite shippers in the Lake trade that they are not able to get as much as they require. One leading shipper reports that he has not enough on hand to satisfy his Lake trade alone. The demand is general, but the shippers do not relish a shortage on the far side of Lake Michigan, to be satisfied on an all-rail rate Shipments by Lake for the week were 90,000 tons, of which 64,000 tons cleared for Lake Michigan, a specially large proportion for any time of the year.

TORONTO

Domestic coals showing a steady improvement. Steam grades are weak.

With the setting in of cool weather, the market for domestic coal shows increased activity, and the demand for steam fuel is fair, though by no means up to normal, as manufacturing remains quiet. Supplies are coming forward freely, large consignments being received by water in preparation for the approaching close of navigation. Quotations are as follows: Retail, anthracite, egg, stove and nut, $7.75; grate, $7.50; pea, $6.50; bituminous steam, $5.25; screenings, $4.35; domestic lump, $6; cannel, $7.50. Wholesale, f.o.b. cars, three-quarter lump, $3.83; screenings, $2.89.

TOLEDO

Domestic coal in better demand but steam fuel continues inactive. Lake shipping much better than earlier in the season. Car shortage has begun to threaten the Toledo market.

The coal situation is showing little change although there is some natural improvement as the season advances. Steam coal is weak and the demand light. Domestic grades are picking up in demand although prices remain unchanged. The Lake shipping is more active than earlier in the season but is lighter than it would be if the ore demand was not so curtailed; there is little movement of ore as compared to normal seasons.

The country demand has been good. The Pittsburgh No. 8 field is still closed down and at present there is little prospect that the operators and miners will get together. The car shortage is beginning to apper although as yet there is little difficulty in securing an adequate supply but now that the grain movement has begun in earnest some trouble is anticipated.

COLUMBUS

Good demand for domestic grades and lake business active. Steam sizes weak. Some coal sold for freight charges.

With a good demand for all domestic grades and a considerable tonnage going to the Northwest, the local trade has been fairly active. The worst feature of the market is the weakness in the steam grades, which is accounted for by the fact that manufacturing is at a low ebb. The general tone of the market is fairly satisfactory, however, and future prospects are favorable.

Domestic Trade is steady in every section. Dealers are busy taking care of their customers and there is a preference shown for the fancy grades. Pocahontas and re-screened varieties are selling well and there is also a good market for anthracite. Domestic prices are ruling firm and dealers' stocks are only fair; most of the buying is for immediate delivery.

The Lake Trade is active and a considerable tonnage is moving toward the Northwest. Boats are being chartered for the remainder of the navigation season. Docks in the upper Lake ports are in good shape generally and some movement to the interior has been started.

Steam Business is slow in every section. Requisitions for manufacturing plants are not large and railroads are using only a limited amount. Many of the steam users are buying on the open market at extremely low prices. Railroad fuel contracts are still hanging fire.

Production in Ohio mining districts which have signed the wage agreement, is steadily growing larger. In the Hocking Valley the output is estimated at 85 to 90% of normal and the same is true of the output from the Pomeroy Bend district. In the Crooksville district a considerable tonnage has been produced. Massillon is also busy.

The small sizes are weak; nut, pea and slack was sold during the past week as low as 25c. In some cases cars have been taken for freight charges. This state of affairs is due to the large Lake production coupled with the slow steam demand.

Prices prevailing in Ohio are:

	Hocking Valley	Pomeroy	Kanawha
Re-ecreened lump	$1.70	$1.75	$1.65
Inch and a quarter lump	1.60	1.60	1.55
Three-quarter inch	1.40	1.45	1.40
Nut	1.30	1.50	1.20
Mine-run	1.15	1.20	1.10
Nut, pea and slack	0.35	0.40	0.35
Coarse slack	0.25	0.30	0.25

CLEVELAND

Coal receipts heavy, particularly of the fine sizes, which have dropped 5c. a ton under the pressure. The Lake business too light to keep available tonnage busy, boats taking short cargoes to avoid laying up.

Although the retail demand is good, Pocahontas coarse coal was off at the opening of the week. Where $3.85 had been asked on prepared sizes the week before, the price was down to $3.60. Mine-run held up $2.75 and slack was offered at $2.40. Hocking has been sold as low as Fairmount because the mines have produced much more slack than they can possibly store. Mines are not permitted to use railroad cars for storage as formerly. Coarse coals were also easier with the return of warm weather. Last week cooler weather slightly increased the demand for all grades of coal, but natural gas is being produced here in such large quantities that people are getting to rely upon it more and more.

The Lake Trade is not much better than it was. While there has been improvement in some quarters the gain has been slight. The outlook in the Lake business is not promising so far as large shipping is concerned except in hard coal, the Lake markets having been neglected for Eastern and Canadian trade.

Prices for current shipment are as follows:

	Pocahontas	Youghiogheny	Bergholz	Fairmount	W. Va. No. 8
Lump	$3.60				
Lump, 6 in.			$2.45		
Egg	3.60				
Egg, 6 in.			2.10		
Lump, 1¼ in.		2.40	2.20		
Lump, ¾ in.		2.30	2.10	2.00	2.05
Mine run	2.75	2.15	2.00	1.90	1.95
Slack	2.40	1.55@1.60	1.55	1.50@1.55	1.50

CINCINNATI

Increasing domestic demand and decreasing steam consumption have created a difficult situation. Transportation facilities are unusually good for the season.

Unseasonably cool weather, together with the fact that most of the domestic consumers have now begun the storage of their winter supplies, has resulted in this demand increasing greatly. On the other hand, depressed conditions prevail in numerous manufacturing trades on account of the war. This has resulted in an unprecedentedly low consumption of slack for this season, which, with the large demand for domestic coal, places the trade in a most difficult position. Prices are naturally much demoralized, nut and slack being offered at ridiculous figures, with no takers.

COKE

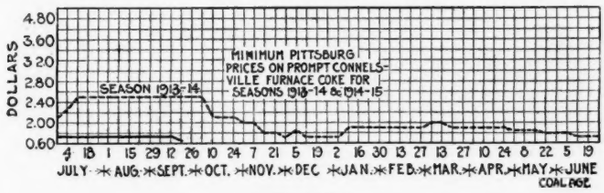
CONNELLSVILLE

There is no market for coke at all,outside of occasional small lots of prompt furnace coke sold at concessions from previous quotations. It is rumored that as low as $1.50 has been done, but such rumors are not verified, and we quote prompt furnace at $1.65@1.70, or 5c. below the former quotation, quoting contract at $1.75@1.90, these quotations being purely nominal. Foundry remains quotable nominally at $2.25@2.35 for prompt and $2.35@2.50 for contract, at ovens.

Operators have no hopes of effecting sales at this time, the furnaces in operation being well covered and receiving ample shipments on contracts, resulting in occasional orders for suspensions.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Sept. 5 at

267,870 tons, an increase of 8187 tons, and shipments at 270,310 tons, an increase of 6197 tons. The figures are evidently exceptional since the general trend is towards decreased consumption of coke through the iron and steel industry slowing down.


DOLLARS
4.80
3.60
3.20
2.80
2.40
2.00
0.60
MINIMUM PITTSBURG PRICES ON PROMPT CONNELSVILLE FURNACE COKE FOR SEASONS 1913-14 & 1914-15
SEASON 1913-14
4 18 1 15 29 12 26 10 24 7 21 5 19 2 16 30 13 27 13 27 10 24 8 22 5 19
JULY AUG. SEPT. OCT. NOV. DEC JAN. FEB. MAR. APR. MAY JUNE
COAL AGE

BUFFALO

The demand for commercial coke is not improved. Shippers dislike to discuss the market, as it has so long been against them. Those who handle crushed coke find a better demand for it, but that would be natural, as it is a competitor of anthracite and will sell more readily from now on during the cold season. Iron ore receipts by lake are good, but the price of best 72-hr. Connellsville foundry is $4.25, with stock coke $3.30.

BIRMINGHAM

Unlike the coal market, coke has been little affected by the war. The demand for foundry coke is still small, and there is practically nothing doing in furnace grades.

ST. LOUIS

There still continues to be a small tonnage of byproduct domestic coke moving in from the East, with practically no new inquiries on foundry coke. Local gas house is moving fairly good, but not in the tonnage that has been anticipated.

CHICAGO

The market continues quiet prices being as follows: Connellsville, $4.90; Wise County, $4.75; byproduct, egg, stove and nut, $4.85; gas house, $4.25.

SOUTHERN

BIRMINGHAM

Business good and mines are working on fair schedules. Some South American orders have already been closed and more are pending.

Both orders and shipments of lump coal show an improvement over last week, although retail dealers, as a rule, are not laying in as large stocks as has been the custom in the past. Many of the operators are running only about four days a week but others are running full and are well supplied with orders.

As a result of the war, the steam business has improved to a large extent, heavy shipments being made to all Southern ports in view of the possible South American trade, and the increased demand from tramp steamers and others. Negotiations are still under way for the arrangement of bottoms and finances for the South American trade, and while matters have not been definitely settled, it is understood that the prospects are good.

Announcement is already made of the sale of two cargoes of coal by the Roden Coal Co. to be shipped to the Eastern coast of South America, one cargo to go from Mobile and other from Pensacola. That permanent trade relations will be established between the Birmingham district and South America, is freely predicted.

LOUISVILLE

Market heavy, due to slowing up of industrial consumption. Current business confined entirely to contracts. Demurrage coal beginning to appear.

The local coal market is demoralized. There is a big accuumulation of steam coal, caused by the rapid slowing up of industrial operations, while the demand for domestic fuel has been less than expected. The retailers seem to be well stocked up, and the consuming demand has not yet been brisk enough to require any additional orders.

For this reason, current business is slow, though the operators are shipping rather freely on business booked some time ago for September delivery, while October orders are also satisfactory. Some of the coal companies are selling for immediate delivery on a basis of the advanced prices quoted Sept. 1, but others are shading these quotations considerably and making other inducements in order to get the business. Reports from other large cities in this section indicate that the supply of steam grades is excessive in those markets as well as locally.

Shipments from the Jenkins and McRoberts plants of the Consolidation Coal Co. were heavier the past week than for a long time. European war has stimulated the Eastern Kentucky market to some extent.

Eastern Kentucky nut and slack are selling at 50 to 60c. for good grades; No. 2 run-of-mine is being offered at 80 to 90c.; straight run-of-mine at $1.10@1.20, block coal at $1.70 to $1.80, all f.o.b. the mines. Demurrage coal is being sold in Louisville at prices considerably under these figures. Western Kentucky grades are in about the same condition as the Eastern coals, and quotations run from 25 to 50c. a ton less, depending on the grade.

MIDDLE WESTERN

INDIANAPOLIS

Slight improvement in the general situation. Mines continue on same running schedules. Prices satisfactory, except on slack.

Prices have stayed at a comparatively low level for several months, and the indications are for an advance. The war, improved financial situation, colder weather and the expected larger movement of grain are all bullish factors. The only marked improvement now is in the demand for domestic grades, although there is a slight betterment in the steam sizes.

Prices are fair on all grades, but slack, which has a range of 45c. to 65c, No. 4 suffering the least depression. Mines continue to make better than half time. Operators have been considering again the possibilities of storing accumulating slack. The transportation situation is easy at present, but operators believe there will be a tightening up in October when corn begins to move. Retailers have not changed prices this month and seem content to have a fair movement to consumers' bins. The first spurt of the larger domestic buying is over, and the lessened demand for the time will give mines a chance to clean up on slack. The low prices for the latter tend to keep quotations on lump and other grades at a stiff level.

There are scattering reports of industrial improvement, especially at railroad shops and the big steel manufacturing plants at Gary are running at the top notch of the year. The August and early September movement of Eastern coals into winter storage has made holes in retailers' stocks, which they are again filling up before prices are enhanced.

ST. LOUIS

Domestic grades holding strong but steam market is threatening to establish a new low level. Railroads choked with steam coals.

The market continues good for high-grade domestic sizes, but is lagging on washed coal and steam. In fact, the steam market is about as low now as it has been in the past three years, and there are indications that it will establish some lew low records, as far as Nos. 4 and 5 washed and screenings are concerned. Screenings from the Carterville field are down to 30c., and No. 4 washed has touched as low as 25c. On the other hand, lump and egg are still strong at from $1.75 to $1.85 and in some cases $2. This unusual situation is due to the fact that the operators are unable to move their steam sizes, and the railroads refuse to give them more equipment.

The outlook continues excellent in the domestic market. In the Standard market screenings are down to 20c., and 2-in. lump is going at $1 although an effort is being made on the part of some operators to get it to $1.10; 6-in. lump is in good demand at from $1.25 to $1.35, while 3x6 egg is held at $1. The Standard market is not in the healthy condition that it should be at this time, but colder weather may bring about better results.

Anthracite still continues to move fairly good, with no demand for smokeless.

The prevailing circular is:

	Williamson and Franklin Co.	Big Muddy	Mt. Olive	Standard	Sparta
2-in. lump	.....	....	$1.30	$1.00@1.10	$1.15
3-in. lump	.....	....	1.40	....	.....
6-in. lump	$1.75@2.00	....	1.50	1.25@1.35	1.35
Lump and egg	1.85@2.15	$2.25	.....	....	1.15
No. 1 nut	1.25@1.50	....	.....	0.75@0.80	.....
Screenings	0.70@0.75	....	0.80@0.85	0.20@0.25	0.35
Mine-run	1.05@1.10	....	.....	0.75@0.80	.....
No. 1 washed nut	1.60@1.75	2.25	1.50	....	.....
No. 2 washed nut	1.25@1.40	....	1.35	....	.....
No. 3 washed nut	1.10@1.20	....	.....	....	.....
No. 4 washed nut	0.95@1.05	....	.....	....	.....
No. 5 washed nut	0.30@0.40	....	.....	....	.....

CHICAGO

Prices on domestic coals increasing. The anthracite market is improving in all departments.

There have been advances in practically all the domestic coals but on the other hand there have been sharp recessions on certain of the steam sizes.

The demand for Carterville coal has been somewhat uneven. Some of the operators have sold up on their advanced circular price of $1.75 for the lump, egg and No. 1 washed. The demand has been so heavy that some have even withdrawn from the market temporarily. There is a slightly better demand for Indiana steam coal from some of the factories which seem to be expanding a little day by day. A decided increase in the demand for Indiana domestic grades has been noted.

The anthracite market is showing a progressive improvement. Both the dock and the all-rail trade have been active in all sizes. The smokeless coal market quieted down within the last week. The better grades of smokeless coal are selling at the circular price of $1.40 for mine-run; off-grade coals are not offered for less than $1.25 and in some cases for $1.30 or $1.35. The Hocking situation has been abnormal. The advance to $1.60 a ton has not retarded business in any degree.

Prevailing prices in Chicago are:

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump	$2.22@2.32	$2.65@2.80	$2.27	
Steam lump	1.87@1.92		1.97	
Egg		2.65@2.80		$3.30@3.45
Mine run	1.87	2.15@2.25	1.87	4.05@4.30
Screenings	1.07@1.12	1.45@1.55	1.07@1.12	

Harrisburg quotations are: Domestic lump and egg, $2.65@2.80; steam lump, $2.15@2.20; mine run, $2.15@2.25; screenings, $1.45@1.55; No. 1 nut, $2.65@2.80; No. 2 nut, $2.30@2.40.

Prices for Carterville coal are: Lump and egg, $2.65@2.80 No. 1 washed, $2.80; No. 2 washed, $2.30@2.40.

KANSAS CITY

Wholesale and retail trade show little change though colder weather has stimulated the domestic demand. Prices are unchanged.

The price situation continues the main subject of interest. The expected increase of Sept. 15 now seems to have been postponed indefinitely; some say the present level will be maintained all winter but others are of the opinion that 25c. will be added Dec. 1, and 25c. a month thereafter. This is the first fall for several years that the price has not advanced Sept. 1.

The pronounced cold snap recently has forced many into the market and there is a chance that prices will advance, Oct. 1.

PRODUCTION AND TRANSPORTATION STATISTICS

ANTHRACITE SHIPMENTS

Anthracite shipments for August and the first eight months of this year and last year were as follows:

	August		8 Months	
	1914	1913	1914	1913
Phila. & Reading	904,643	855,343	7,768,256	8,616,490
Lehigh Valley	1,079,172	1,035,934	8,260,472	8,640,052
Cent. R.R. N.J.	637,467	656,154	5,735,445	6,067,368
Del. Lack. & West.	819,848	862,602	6,245,125	6,523,639
Del. & Hudson	619,062	603,876	4,706,619	4,698,004
Pennsylvania	497,579	469,875	4,121,427	4,076,893
Erie	734,350	686,985	5,441,578	5,449,938
Ont. & Western	191,622	199,131	1,542,467	1,697,222
Total	5,483,743	5,369,900	43,821,389	45,709,606

VIRGINIAN RAILWAY CO.

Shipments over this road for June and July, with details of leading operators were as follows in short tons:

Shipper	June	July
Knw., Glen Jean & E. R.R.	32,920	24,084
E. E. White[1]	26,073	29,424
Gulf Smokeless	21,869	22,294
Loup Creek Colliery	20,717	19,139
Slab Fork	19,811	20,544
New River Collieires	19,244	8,906
Pemberton Coal & Coke	17,253	18,212
E. E. White[2]	16,253	18,788
MasAlpin	14,324	14,906
Windin Gulf Colliery	13,278	14,268
Long Branch	12,454	10,545
Bailey Wood	11,707	11,544

[1]From Glen White. [2]From Stotesbury.

Gross shipments totaled 286,354 tons as compared with 321,626 for July, 1913, and 321,181 tons for June of the current year.

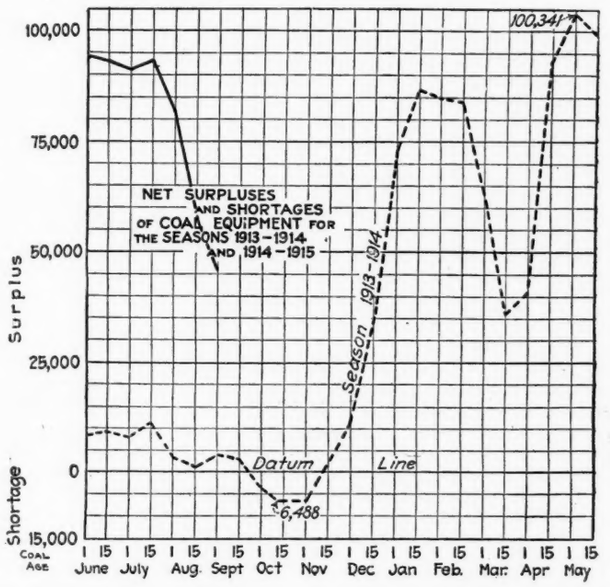
THE CAR SITUATION

American Ry. Association reports surpluses and shortages of coal equipment for two weeks ended Sept. 1, as follows:

	Surplus	Shortage	Net*
New England Lines	1,288	0	**1,288**
N. Y.; New Jersey, Del.; Maryland; Eastern Penn.	11,343	0	**11,343**
Ohio; Indiana; Michigan; Western Pennsylvania	18,394	0	**18,394**
West Virginia, Virginia, North & South Carolina	3,176	0	**3,176**
Kentucky, Tenn.; Miss.; Alabama, Georgia, Florida	2,779	0	**2,779**
Iowa, Illinois, Wis., Minn.; North & South Dakota	4,078	3	**4,075**
Montana, Wyoming, Nebraska	665	0	**665**
Kansas, Colorado, Missouri, Arkansas, Oklahoma	1,848	46	**1,802**
Texas, Louisiana, New Mexico	241	13	**228**
Oregon, Idaho, California, Arizona	2,329	4	**2,325**
Canadian Lines	0	0	**0**
Total	46,141	66	**46,075**

	May 1	May 15	June 1	June 15	July 1	July 15	Aug. 1	Aug. 15
Surplus	100,370	99,664	94,770	93,520	91,280	93,509	82,284	56,560
Shortage	29	313	7	49	430	292	110	496
Net*	**92,115**	**100,341**	**99,351**	**94,763**	**90,850**	**93,217**	**82,174**	**56,064**

***Bold face** type indicates a surplus.


100,000
75,000
50,000
25,000
0
15,000
Surplus
Shortage
NET SURPLUSES AND SHORTAGES OF COAL EQUIPMENT FOR THE SEASONS 1913-1914 AND 1914-1915
Season 1913-1914
Datum Line
6,488
100,341
COAL AGE
1 15 1 15 1 15 1 15 1 15 1 15 1 15 1 15 1 15 1 15 1 15 1 15
June July Aug. Sept Oct Nov Dec Jan Feb. Mar. Apr May

FOREIGN MARKETS

ENGLAND

Trade quiet and slowly readjusting itself to the changed conditions. General reduction in war, insurance and freight rates.

The London coal trade is quiet. The prevailing hot weather keeps the consumption low. Supplies are coming in slowly, and the dislocation of the railway traffic has been pronounced. Manufacturing qualities are moving freely, and the export trade is reported better. Small nuts and slacks have been plentiful, and prices are weakening. Colliery quotations for house coals are still withheld.

One by one the barriers which held up the coal trade at the beginning of the war have been removed, and although the conditions prevailing previous to the outbreak cannot quite be renewed, everything possible to facilitate trade is being done. The reduction in war risks, insurance rates, and also in freight rates have further improved the situation, indeed, so low have the latter fallen that some shipowners have threatened to lay up ships.

To deal with the markets separately: Newcastle continues to show improvement in both prompt and forward business; the pits also are working slightly better. At Cardiff, too, matters are progressing much more favorably, and the demand in some cases has caused a slight increase in prices. In the Midlands trade is still quiet, though in the Yorkshire market a better inquiry is to be noticed. The market in the East of Scotland shows briskness, whilst that in the West has also improved.

The moratorium has been extended to October 4.

War risks insurance rates have been reduced from three to two guineas per cent. on cargo shipments. A reduction of a half per cent. in the premium on hulls has also been conceded.—"The Colliery Guardian."